

## THE IMPACT OF ADOPTING SUSTAINABLE INNOVATION IN ACHIEVING GREEN CORE CAPABILITIES-AN ANALYTICAL STUDY IN GARMENTS FACTORY IN ALNAJAF AL-ASHRAF

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### ABSTRACT

The main purpose of this research is to study the role of sustainable innovation in achieving green core capabilities in garments factory in alnajaf al-ashraf. The study attempted to answer a number of questions, the most important of which is what is the degree of practice of sustainable innovation in the sample factory of the research in the Holy City of Najaf, and to determine the extent to which the relationship and impact of adopting sustainable innovation in achieving green core capabilities in the laboratory research sample in Najaf. Two main hypotheses were tested, each hypothesis included three sub-hypotheses, The research was applied to a sample of (34) individuals from the managers and workers of the researched laboratory in Najaf Al-Ashraf, and the data was analyzed using the SPSS program. The most important findings of the research are that the management of the researched laboratory lacks expenses for sustainable environmental innovation, especially in the field of green spaces, pollution measurement technology, and others, due to the decline in funding resources for the industrial sector, While the study recommended motivating manufacturing organizations in general, through the Ministry of Industry, especially the laboratory under study, to adopt sustainable environmental innovation behaviors as an urgent competitive strategy for our national organizations through funding the industrial sector in this field, in a way that ensures improved sustainability in performance.

**Keyword:** sustainable innovation, environmental innovation, core capabilities.

### INTRODUCTION

Business organizations of all orientations face growing challenges due to the escalation of global competition and the rapid transformations towards the era of digital and virtual technology. In light of these challenges, business organizations are racing to enhance their strategic capabilities to be flexible, proactive and innovative organizations to confront sudden events in the competitive environment, as sustainable innovation practices are considered critical and essential success factors for improving environmental, social and economic indicators.

The analytical review of the literature showed that there is a knowledge gap in the field of diagnosing the impact of sustainable innovation on green core capabilities. What confirms this knowledge gap is the scarcity of studies that have dealt with this topic. Based on the above, the fundamental goal of this study is to diagnose the impact of sustainable innovation on green core capabilities, and in this In the context, the problem of the study was: What is the nature and level of the impact of sustainable innovation on the green core capabilities in the ready-

made garments factory in Najaf. The researcher used a measurement tool and in order to answer the questions of the study, a conceptual diagram was developed that embodies the causal relationships between sustainable innovation and the green core capabilities in the factory in question. In the research, the researcher employed a measurement tool developed for this purpose based on a five-point Likert scale. The validity and reliability of the scale was tested using the Statistical Package for the Social Sciences (SPSS) program. The study also employed descriptive and inferential statistical methods to test the model and its hypotheses. The study represented an attempt to clarify the overlap or intellectual integration between the literature on sustainable innovation and its impact on enhancing green core capabilities in the factory under study. The data collected from (35) respondents was analyzed and included: The research has four sections, the first dealt with the scientific methodology of the research, the second dealt with the theoretical framework, while the third represented the practical aspect, and the fourth reviewed the most important conclusions and recommendations that were reached.

#### **The first section: scientific research methodology**

**First: - Research questions:** - In light of the changes in technology and the information revolution that organizations of all types are experiencing, which have forced them to live in a state of competitive pressures and challenges, and in order not to lose their markets and customers and thus their market share, it has become necessary for them to search for methods and practices that enable them to compete and survive in a world. One of these methods is adopting a sustainable innovation method in production processes. This method requires the concerned organization to pay attention to the environmental, social, and economic aspects, which contributes to enhancing the organization's general capabilities, especially the green core capabilities. Therefore, the research problem can be formulated with the following questions- :

- 1- What is the level of awareness of the concept of sustainable innovation in the ready-made clothing factory in Najaf?
- 2- -What is the degree of practice of the sustainable innovation process in the ready-made clothing factory in Najaf?
- 3- -What is the level of availability of green core capabilities in the ready-made clothing factory in Najaf?
- 4- Is there a correlation between the sustainable innovation process and the green core capabilities in the ready-to-wear garment factory in Najaf?
- 5- Is there an impact of the sustainable innovation process on achieving the core green capabilities in the ready-made garments factory in Najaf?

**Second: - The importance of the research:** - The importance of the research stems from its treatment of one of the important topics in the administrative field, which is the process of sustainable innovation and its role in achieving green core capabilities, in light of the state of uncertainty experienced by institutions with their various orientations and with the accelerating global changes that require anticipating the future and trying to adopt Administrative patterns that suit the modern vision. Hence the importance of focusing on the

issue of green core capabilities as it is one of the vital and modern topics, the fruits of which can be reflected if it is applied on the field side to the performance of factories to avoid risks and enhance strengths and thus lead to achieving the desired goals by trying to employ Sustainable innovation that leads to enhancing green core capabilities and, as a result, the effectiveness of the entire organization's performance.

**Third: Research objectives: Based on the problem and importance of the research, the research objectives can be expressed as follows:**

- 1- Determine the level of sufficient awareness of the concept of sustainable innovation in the laboratory sample of the research.
- 2- Identifying the nature of practicing sustainable innovation in the research laboratory.
- 3- Determine the level of availability of green core capabilities in the laboratory of the research sample in Najaf.
- 4- Identifying the level of interconnection of the sustainable innovation process with the level of achieving the green core capabilities of the research sample factory in Najaf.
- 5- Explaining the role of sustainable innovation in the process of achieving the core green capabilities of the research sample factory in Najaf.

**Fourth: Hypothetical research model:**

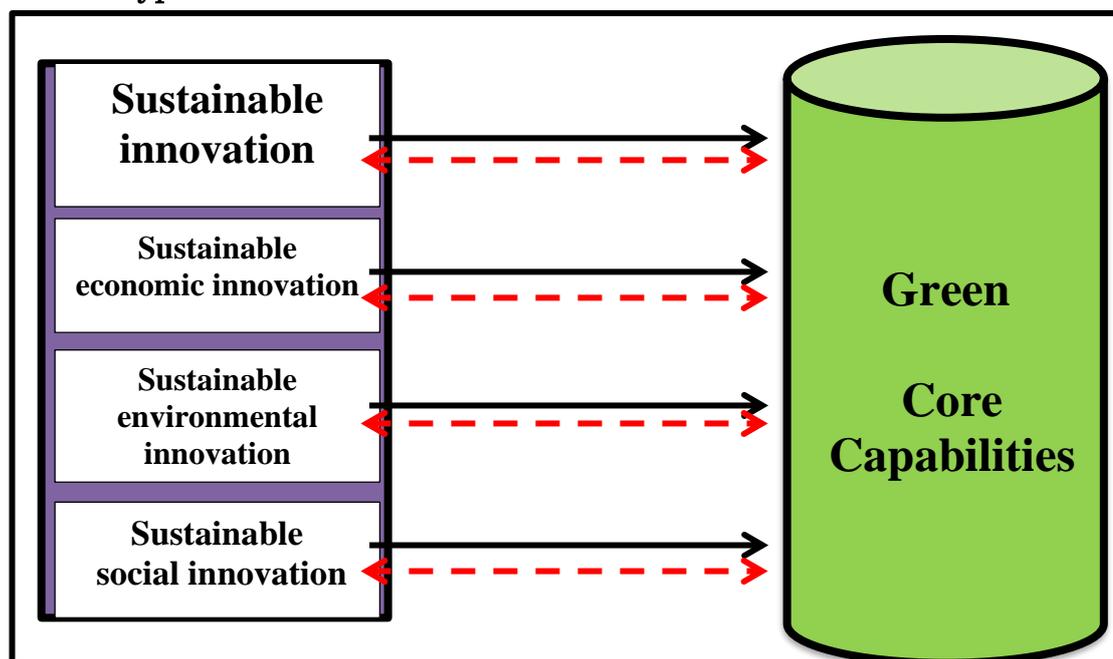


Figure (1) Hypothetical research model

**Fifth: - Research hypotheses: - The research attempts to prove the validity of the following hypotheses: -**

**The first main hypothesis: - There is a significant correlation between the sustainable innovation process and the green core capabilities variable in the research sample factory in Najaf.**

This main hypothesis is divided into the following sub-hypotheses:

- 1- There is a significant correlation between the dimension of sustainable economic innovation and the green core capabilities variable.
- 2- There is a significant correlation between the sustainable environmental innovation dimension and the green core capabilities variable.
- 3- There is a significant correlation between the sustainable social innovation dimension and the green core capabilities variable.

**The second main hypothesis:** - There is a significant influence relationship for the sustainable innovation process on the green core capabilities variable in the research sample laboratory in Najaf.

This main hypothesis is divided into the following sub-hypotheses:

- 1- There is a significant relationship of influence for the dimension of sustainable economic innovation on the green core capabilities variable.
- 2- There is a significant influence relationship for the dimension of sustainable environmental innovation on the green core capabilities variable.
- 3- There is a significant influence relationship for the social innovation dimension on the green core capabilities variable.

**Sixth:** - Research method and method: - The research method and method include all of the following elements: -

1- **Research methodology:** In order to achieve the research objectives and ensure the validity of its hypotheses, the descriptive analytical method was used, which included the field method, where a questionnaire form was adopted to collect and analyze data, which included (23) items, as shown in Appendix (1), in addition to using a desk survey to review books. And Arab and foreign research and articles related to the topic under investigation.

2- **Research population and sample:** The research population is represented by the ready-made clothing factory in Najaf, where a sample was chosen consisting of a group of department and division managers, which included (35) individuals working in the factory. After the questionnaire was distributed to them and retrieved, it became clear that there was one of the questionnaires. It is not valid for statistical analysis, and therefore the percentage of retrieved forms that are valid for statistical analysis is more than (97%).

### 3- Research tool and scale

A - **Sustainable innovation:** - The sustainable innovation variable was measured according to the scale (Calik & Bardudeen, 2016), where sustainable innovation was divided into three dimensions: (sustainable economic innovation, sustainable environmental innovation, sustainable social innovation) and these dimensions included (15) paragraph.

B- **Green core capabilities:** - The researcher relied on the scale (Al Halbusi et al., 2022) to measure the green core capabilities variable, as this variable was represented by a single

dimension and this dimension included (8) items. A five-point Likert scale was used to measure the relative weight of the respondents' answers. .

#### 4- Statistical methods used in the research

In analyzing the data, the researcher relied on a set of statistical methods according to the statistical program (SPSS Ver 26). These methods were as follows: -

A - Descriptive statistical methods, represented by the arithmetic mean, standard deviation, and coefficient of variation, to determine the descriptive characteristics of the respondents' answers.

B - Statistical methods for verifying the validity and reliability of the questionnaire, which included Pearson's correlation coefficient, Cronbach's alpha coefficient, Spearman-Brown split-half coefficient, and Guttman's coefficient.

C- Inferential statistical methods to verify the research hypotheses included:-

- Pearson correlation coefficient to determine the correlations between the research variables.
- Simple linear regression analysis to show the effect of the independent variable on the dependent variable.

### The second section: The theoretical framework

#### First: sustainable innovation

1- **The concept of sustainable innovation:** - Organizations, governments and individuals are constantly seeking innovative products that make our lives simpler, more effective and easier. However, many do not consider the effects of these products through their life cycle and their impact on the economy, society and the environment (Flores et.al, 2018:1)

There is a prevailing opinion among scientists and industry experts that innovation is the main driver of sustainability, and this is due to the fact that sustainability is a pressing issue that requires immediate action and changes from governments, industry and society as a whole (Silvestre & Țîrcă, 2019: 325).

In recent years, the challenges facing the industrial sector have increased, such as financial restrictions due to inflation, energy shortages, increased competition in the Middle East region, and the introduction of new technologies. With all these challenges, organizations strive to survive and achieve economies of scale. As well as traditional business imperatives such as reducing costs, increasing value and improving quality; So an increasing number of organizations are now trying to integrate sustainability into their decision-making processes. Integrating sustainability into the business environment. This requires taking into account the so-called triple bottom line, which includes environmental, economic and social performance indicators in management activities and evaluation processes (Negmb & Mostafaa 2018: 1008). Innovations are considered the key to achieving economic growth and employment growth, which means that at the same time An important factor for achieving a sustainable improvement in the world's standard of living (Depczyńska-Szopik et al,2018:251) Sustainable innovation is the company's implementation of a new product, process, or practice, or modification of an existing product, process, or practice that significantly reduces the impact of the company's activities on the natural environment. Sustainable product innovation is the company's introduction of a new product or modification of an existing product, which has an

environmental impact during the product's life cycle, which It includes resource extraction, production, distribution, use and disposal after use (Varadarajan, 2015:17). Sustainable innovation can also be defined as a trend that requires management of economic, social and environmental aspects, so that they can become integrated in the design of new products, processes and organizational structure. Sustainable innovation can include product innovation, process innovation, and organizational innovation, which focuses mainly on improving the sustainability of the organization (De et al, 2018:4), while (Tura) sees sustainable innovation as a concept that means the organization's deliberate changes in its operations, values, and procedures that aim To create economic, environmental and social value, sustainability-oriented innovations range from products and services to improvements in processes and entire business models (Tura, 2018:26)

## 2- Characteristics of sustainable innovation

(Nick Jane, 2022:2) (Gennaro Cofano, 2022:4)

- ✦ Environmental Responsibility: Sustainable innovation aims to reduce resource consumption, reduce waste and pollution, and mitigate negative impacts on ecosystems. It encourages the use of renewable energy, sustainable materials and technological innovation.
- ✦ Social Impact: Sustainable innovation takes into account social justice, inclusivity, and the well-being of communities. It seeks to address social challenges, such as poverty, inequality and access to education, health care and clean water. This may include developing products or services that improve the quality of life for disadvantaged populations.
- ✦ Renewable energy and clean technologies: Innovations in renewables, energy storage and energy efficiency are critical components of sustainable innovation. These technological innovations aim to reduce dependence on fossil fuels and mitigate the effects of climate change.
- ✦ Cost Savings: Sustainable innovation recognizes the importance of economic sustainability. It strives to create value and generate economic benefits while ensuring long-term profitability. Adopting sustainable practices often results in cost savings through increased energy efficiency and reduced waste disposal expenses.
- ✦ Collaboration and partnerships: Sustainable innovation often requires collaboration between various stakeholders, including companies, governments, NGOs, research institutions and local communities. Partnerships allow pooling of resources, knowledge and experience to drive sustainable solutions on a broader scale.

## 3- Dimensions of sustainable innovation

Sustainable innovation can be viewed as a process in which sustainability considerations (environmental, social, and economic) are integrated into the organization's systems, from idea generation to research, development, and marketing. This applies to products, services, and technologies, as well as to new business and organization models. Sustainable innovation is also defined as any new or significant improvement in products, services, technological or organizational processes, which are marketed or implemented internally, and which not only

provide economic benefits, but also lead to positive social and environmental impacts, as shown in Figure (1). (Calik & Bardudeen, 2016: 449, 450)

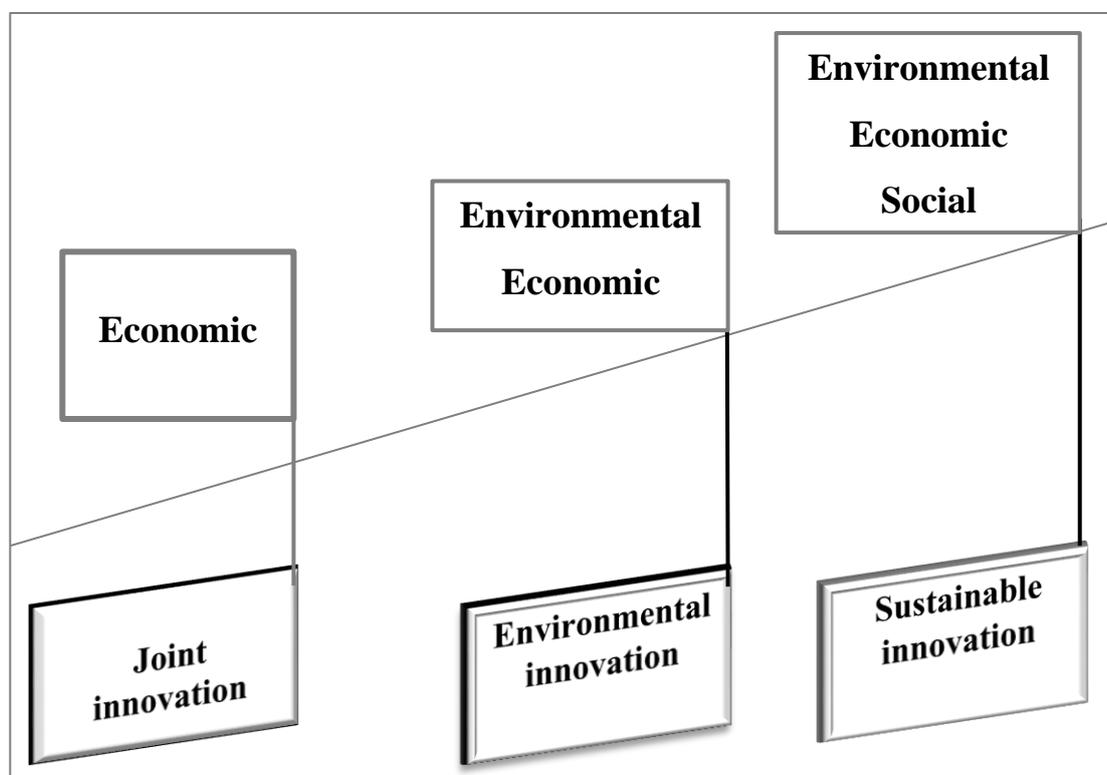


Figure (2) The evolution of sustainable innovation

Source: Calik, E., & Bardudeen, F. (2016). A measurement scale to evaluate sustainable innovation performance in manufacturing organizations. *Procedia Cirp*: 450

Sustainable innovation covers sustainable environmental innovation and includes societal dimensions along with environmental aspects. The following is a description of each dimension of sustainable innovation:

#### A- Sustainable economic innovation

Spending on innovation covers expenses for research, development, training and marketing activities, which is essential for managing the basic processes of innovation. Therefore, new sustainable products or new sustainable processes that change resource efficiency and productivity are common strong output indicators of innovation performance, as are sustainable patents and a patent citation for a product or product. Sustainable operation is another prominent criterion for measuring the impact of sustainable innovation in the short term (Bardudeen & Calik, 2016:451).

Sustainable economic innovation is a process of change that introduces new economic and organizational elements, in the needs that are met, in the goods and services that are produced, and in the methods of producing, distributing and using these goods and services. The unit of reference varies according to the specific analytical level. It may be an organization, or consumers, but They may also be local, regional or national economies. (Ramella,2015:10)

## **B- Sustainable environmental innovation**

The OECD defines sustainable environmental innovation as the creation of new or significantly improved products (goods and services), processes, marketing methods, organizational structures and institutional arrangements that lead to environmental improvements compared to related alternatives (Kemp & Anthony, 2009:5). Regulators towards environmental improvements in terms of pollution emissions, as sustainable environmental innovation is directed towards this goal, aligning this type of investment with external demands compared to other environmental practices, which may be effective in the short term in pointing in the right direction but are subject to being separated from implementation. Actual (i.e., it may be simply cosmetic), here sustainable eco-innovation is a proactive initiative with a longer horizon, requires greater commitment, has superior chances of having a greater impact in terms of polluting emissions, and is therefore more likely to reap the social benefits of satisfaction (Berrone et al. al,2013:893-894)

## **C- Sustainable social innovation**

Sustainable social innovation is a new solution to a social problem that is more effective, efficient and sustainable than current solutions and that accumulates value that was originally created in society as a whole (Oeij et al, 2019:244). Sustainable social innovation can be defined as the reshaping of social practices, in response For social challenges, which seek to enhance outcomes on social well-being and necessarily include the involvement of civil society actors (Nijnik et al, 2019:208). Sustainable social innovation is also defined as changes in the attitudes, behavior or perceptions of a group of people who have joined a network of interests. Compatible, with respect to the horizon of group experiences, leads to new and improved ways of working collaboratively within the group. (Soma et al, 2018:364)

## **Second: Green core capabilities**

### **1- The concept of green core capabilities**

A natural resource-based vision, the way organizations interact with their natural environment, is crucial due to increasing pressure from various stakeholders. This vision addresses various stakeholder concerns regarding the impact on the environment and ensures various benefits such as energy saving, environmental recycling, and environmental saving. materials, pollution prevention, etc. (Wang, 2019: 667). The natural resource-based vision is based on three pillars: pollution prevention, product management, and sustainable development. Scientists and management experts urge organizations to change their traditional operations in environmentally friendly ways. In addition to traditional core capabilities, researchers urge that organizations should invest in building Green core capabilities to deal with the most pressing issue (i.e. environmental management), and it is believed that these capabilities will lead to diversification of the organization's production and operational skills (Kaya & Gökçaya, 2015:90)

As a result, organizations will better handle the business of recycling, material substitution, manufacturing processes, etc. to prevent pollution. Likewise with green knowledge (as a core green capability) managers will be in a better position to oversee product design and development with minimal negative impact on the environment, ( Prahalad, & Hamel,

2018:353); Moreover, green core capabilities break down traditional methods of innovation and encourage the adoption of low-impact technology to achieve sustainable growth. Likewise, green core capabilities emphasize identifying, assimilating and exploiting external knowledge to deal with environmental issues (e.g. pollution prevention, efficient use of scarce resources) effectively. and efficiency) (Chen et al., 2015:501) Green intrinsic capability also leads to the collection of useful external information that can be used for better product management. (Zou & George, 2018:92).

The term green core capabilities was first used by Prahalad and Hamill in 1990. According to them, core capabilities represent the sum of learning across the set of individual skills and individual organizational units while Bogner and Thomas (1994) defined core capabilities as specific skills. Fixed and cognitive attributes directed towards achieving the highest possible level of customer satisfaction compared to competitors, (Trott, 2013:19)

These capabilities can help the organization in performing various tasks. Organizations with core capabilities can integrate technologies and add various production skills. Therefore, core capabilities can be used as a strategic tool for the organization to achieve the desired level of results. Therefore, the organization must build the core capability to achieve competitiveness along with the benefits. Other tangible (Prahalad, & Hamel, 2018:354), building and organizing core capabilities can sometimes be difficult for organizations, and specific steps can be followed to add core capabilities in the organization. First of all, the organization must define the core capabilities, According to the need then the organization should consider redesigning its structure to organize and accommodate these capabilities by providing a driving force for learning from alliances (Abbas & Sagsan, 2019:615). Therefore, they can be introduced, and core capabilities can meet multiple requirements of the organization, such as providing the ability to Access to new markets, can increase the benefits to customers' products, and may also be difficult for competitors to reproduce, and (Chen) sees green core capabilities as a combination of organizational resources and capabilities, internally and externally, organized and embedded in all functions and operations The organization, so that it does not negatively affect the external environment and the organizational ability to sustain (Chen, 2008:534). From the above, green core capabilities can be defined as a set of resources and skills (capabilities) that distinguish the organization from competitors. It is the real resource for sustainable competitive advantage and is embodied through the ability The organization seeks to achieve consensus among various stakeholders in a way that achieves the economic, social and environmental interest and enhances the organization's ability in current and new markets, responds to customer needs, and achieves the greatest value for the customer by distinguishing the organization's products from competitors and making them difficult to imitate.

## **2- The importance of green core capabilities**

It has become clear that the importance of green core capabilities is represented in the organization's ability to achieve its goals, implement its strategy, and outperform its competitors through its distinguished performance resulting from developing new environmentally friendly and innovative products or improving existing products to meet the needs of customers, or from the organization constantly developing the efficiency of its

employees from During learning and training for the purpose of supporting strengths and addressing weaknesses, this requires a regular program to update current skills and create new ones. It also requires the organization's work to develop its strategy to maintain the best market share, as well as enabling it to formulate its future strategies and develop systematic plans to benefit from them in developing untapped capabilities. In the organization and maintaining it. (Srivastava, 2005:52) Green core capabilities meet some requirements, the most important of which is providing access to meet a wide range of environmental needs of markets. It also provides benefits to suppliers as environmental contributions and also makes the core capabilities difficult to imitate by competitors. Core capabilities enable the translation of capabilities. To job opportunities to benefit from skills and knowledge, through which environmental sustainability can be implemented (Bickell, 2013:1), and (Wit & Meyer) indicated that the importance of green core capabilities stems from the fact that they provide a suitable work environment when they make the ability replace capital, and that green core capabilities are Which gives business organizations that seek to maintain their survival and continuity and obtain sustainable competitive advantages, as sustainable competitive advantage is achieved through green core capabilities, that is, through possessing resources, capabilities, and capabilities that are unique to the organization. (Wit & Meyer, 2010:332) The main interest of organizations is in equipping operating units with individuals with technical skills and expertise to benefit from this expertise and invest it in research and development, as well as in infrastructure. This requires employing green core capabilities to give the organization a characteristic of superiority and distinction over its competitors when implementing one or Several critical activities in the value chain. (Thompson & Strickland, 2007:245) The researcher believes that the importance of green core capabilities is represented by the organization's ability to invest its resources in the best possible way, which contributes to improving indicators, such as productivity, profitability, cost reduction, and environmental performance, and this is reflected in reducing prices and improving quality. In order to achieve optimal investment of its resources, it requires the presence of distinctive, high-quality capabilities, as it is the only resource that has the ability to generate greater value for the customer thanks to its quality and high performance, which leads to improved dealing with various situations. This improves the organization's image and increases the degree of customer loyalty and satisfaction, and thus the organization ensures competitive advantage. Sustainable

### **The third section: the practical aspect of the research**

This research includes three parts:-

**The first:** Descriptive analysis of the research variables: This section is concerned with explaining the answers of the research sample members to the questionnaire's axes, and this includes the following:

- Create frequency tables for the form data.
- Transcribing the answers and processing them based on the arithmetic mean and standard deviation, and then arranging the items according to the coefficient of variation.

Results of the sample members' answers to the items of the sustainable innovation variable

Results of the sample members' answers to items after sustainable economic innovation

Table (1) displays the arithmetic mean, standard deviation, and coefficient of variation for items after sustainable economic innovation (n= 34)

The dimension	Paragraph	Answers of the respondents					Arithmetic mean	deviation	Arithmetic mean	deviation
		Totally agree	Agree	neutral	Don' t agree	Totally Don' t agree				
Sustainable economic innovation	1	6	6	21	1	0	4.09	86.60	21.174	5
	2	9	14	11	0	0	3.65	73.40	20.110	4
	3	8	15	11	0	0	3.88	76.90	19.820	3
	4	14	9	11	0	0	4.24	55.40	13.066	1
	5	8	17	9	0	0	4.03	62.70	15.558	2
	Arithmetic mean, standard deviation and the coefficient of variation of the dimension					3.976	38.30	9.633		
Sustainable environmental innovation	6	0	19	3	7	0	3.68	68.40	18.587	2
	7	9	10	12	0	0	3.56	82.40	23.146	5
	8	3	21	6	1	0	4.21	68.70	16.318	1
	9	9	16	6	0	0	3.47	78.80	22.709	4
	10	2	17	4	8	0	3.47	75.40	21.729	3
	Arithmetic mean, standard deviation and the coefficient of variation of the dimension					3.676	51.40	13.983		
Sustainable social innovation	11	14	10	5	2	0	3.44	82.40	23.953	5
	12	4	0	17	10	0	4.00	69.60	17.400	1
	13	8	16	7	0	0	4.26	79.00	18.545	2
	14	13	6	12	0	0	3.50	66.90	19.114	3
	15	3	14	13	1	0	4.09	86.60	21.174	4
	Arithmetic mean, standard deviation and the coefficient of variation of the dimension					3.859	36.30	9.407		

Source: Prepared by the researcher based on computer results

Describe the answers to the dimensions of sustainable innovation

It becomes clear to the researcher from the tables above that show the arithmetic mean, standard deviation, and coefficient of variation for each paragraph of sustainable innovation that:

1- Table (1) measures the dimension of sustainable economic innovation, which represents one of the dimensions of sustainable innovation, as it notes a difference in the degree of sustainable economic innovation in the researched laboratory, as paragraphs (5,4) ranked first and second, while paragraphs (2,1) ranked first and second. It is ranked fourth and fifth among the economic innovation items, which indicates the need for the management of the researched factory to develop programs to improve the factory's efficiency in exploiting and investing resources of all kinds, as well as for the management of the researched factory to adopt a price strategy that enables it to outperform competitors and provide a range of options to its customers in obtaining its products. In general, it appears that there is less than good interest

in the process of sustainable economic innovation, as after economic innovation, we obtained a general arithmetic mean of (3.976), a standard deviation of (38.30), and a coefficient of variation of (9.633).

2- It is clear from the table above that the dimension of sustainable environmental innovation represents one of the dimensions of sustainable innovation, as it is noted that there is a difference in the degree of availability of the environmental innovation dimension in the researched laboratory, as paragraphs (6,8) ranked first and second, which indicates that the management of the researched laboratory seeks to Retaining its customers and reducing their loss rate by improving the products provided to them and providing environmentally friendly products. Also, one of the advantages that the factory enjoys is contributing to achieving environmental sustainability by following a set of procedures and behaviors that contribute to reducing environmental pollution and getting rid of harmful waste, while Paragraphs (7,9) were ranked fourth and fifth, which indicates that the management of the researched laboratory needs to be more distinguished in terms of sustainable environmental innovation expenditures (green spaces, pollution measurement technology, etc.), as well as that the management of the researched laboratory must strive to improve the rates of reducing waste (exhausts). And production waste. In general, it appears that there is a less than good degree of interest in the environmental innovation dimension, as the environmental innovation dimension obtained a general arithmetic mean of (3.676), a standard deviation of (51.40), and a coefficient of variation of (13.983).

3- As shown in the table above, the dimension of sustainable social innovation, which represents one of the dimensions of sustainable innovation, as it is noted that the degree of availability of this dimension in the researched laboratory varies, as paragraphs (13, 12) ranked first and second, and this indicates that the management of the researched laboratory adopts programs Advanced training and qualification for workers, and the management of the researched laboratory is also characterized by a fair level of wages, incentives and rewards system, while paragraphs (11, 15) ranked fourth and fifth, which indicates the need for the management of the researched laboratory to develop modern mechanisms to simplify work procedures and create a working environment. Clean and comfortable for workers, as well as the need for the management of the researched laboratory to work to improve working and safety conditions and provide health care programs for workers. In general, it appears that there is a less than good degree of interest in the social innovation dimension, as the social innovation dimension obtained a general arithmetic mean of (3.859). A standard deviation of (36.30) and a coefficient of variation of (9.407).

### **Describe the answers to the green core capabilities variable**

Results of the sample members' answers to the items of the green core capabilities variable

Table (2) displays the arithmetic mean, standard deviation, and coefficient of variation for the items of the green core capabilities variable (n= 34)

The dimension	Paragraph	Answers of the respondents					Arithmetic mean	deviation	Arithmetic mean	deviation
		Totally agree	Agree	neutral	Don' t agree	Totally Don' t agree				
Green core capabilities	16	6	6	21	1	0	3.50	82.60	23.600	7
	17	9	14	11	0	0	3.94	77.60	19.695	3
	18	8	15	11	0	0	3.91	75.30	19.258	2
	19	14	9	11	0	0	4.09	86.60	21.174	4
	20	8	17	9	0	0	3.97	71.70	18.060	1
	21	6	6	21	1	0	3.50	82.60	23.600	7
	22	5	19	0	10	0	3.56	78.00	21.910	5
	23	6	8	19	1	0	3.56	82.40	23.146	6
Arithmetic mean, standard deviation and the coefficient of variation of the dimension							3.754	33.40	8.897	

Source: Prepared by the researcher based on computer results

Table (2) measures the green core capabilities variable, which represents eight items, where it is noted that the degree of presence of these items in the researched laboratory differs, as paragraph (20) ranked first, and this means that the researched laboratory has workers with a high level of multiple capabilities and skills that can It contributes to presenting ideas for producing a new product. Paragraph (18) also ranked second among the green core capabilities paragraphs. This means that there is agreement that the production of the researched factory is affected by the entry of new competitors in the industry to innovate in providing a new product, while Paragraphs (21) obtained 16) is ranked last among the items of the green core capabilities variable, and this indicates the necessity of the researched laboratory having information about the outputs of technical development and how to use them in a way that contributes to providing new products. Likewise, it is necessary for the researched factory to strive to provide alternatives to raw materials as well as parts for the inputs of the production process, which leads to the introduction of a new product. In general, it appears that there is a less than good level of interest in the process of achieving green intrinsic capabilities in the factory under study, as the green intrinsic capabilities variable occurred. It has a general arithmetic mean of (3.754), a standard deviation of (33.40), and a coefficient of variation of (8.897).

### The second: Validity and reliability tests

First: - Validity of the questionnaire: - To calculate the validity of the questionnaire, the structural validity method was used, through the internal consistency index and using the Pearson correlation coefficient to determine the extent to which the score of each item is related to the total score of the axis.

Calculating the degree of correlation of each paragraph of the dimensions of sustainable innovation and the total degree of the dimension to which it belongs, as shown in Table (3)

Table (3): The degree of correlation of each paragraph of the dimensions of (sustainable innovation) and the total score of the dimension (n= 34)

Dimensions of sustainable innovation	Paragraph	Correlation coefficient
Sustainable economic innovation	1	0.516**
	2	0.513**
	3	0.718**
	4	0.595**
	5	0.718**
Sustainable environmental innovation	6	0.481**
	7	0.691**
	8	0.382*
	9	0.714**
Sustainable social innovation	10	0.896**
	11	0.786**
	12	0.691**
	13	0.725**
	14	0.645**
	15	0.542**

Source: Prepared by the researcher based on computer results

Calculating the degree of correlation of each paragraph of the dimensions of sustainable innovation and the total degree of the dimension to which it belongs, as shown in Table (3)

Table (4) The degree of correlation of each paragraph of the variable (Green Core Capabilities) and the total score of the variable (n= 34)

Dimensions of sustainable innovation	Paragraph	Correlation coefficient
Green Core Capabilities	0.565**	16
	0.515**	17
	0.543**	18
	0.677**	19
	0.384*	20
	0.755**	21
	0.595**	22
	0.664**	23

Source: Prepared by the researcher based on computer results

It appears from the results of tables (4.3) that the values of all items were positive and statistically significant at the level ( $p \leq 0.01$ ), except for paragraphs (20.8), so their correlation was at the level of statistical significance ( $p \leq 0.05$ ), which means that there is a good and important relationship between All paragraphs with their dimensions, and all paragraphs enjoy high structural validity.

**Second: Reliability of the questionnaire:** The researcher calculated the validity of the questionnaire through two methods:

Reliability using Cronbach's Alpha method

The reliability of the questionnaire was calculated using the Cronbach's alpha method, where reliability coefficients were calculated for each dimension of the questionnaire, and then the reliability coefficient was calculated for the questionnaire as a whole, and the results are shown in the following table: -

Table (5) Values of Cronbach's alpha reliability coefficients for the dimensions of the questionnaire and the total score of the questionnaire

Dimensions	Paragraphs	Cronbach's alpha reliability coefficient
Sustainable economic innovation	5	0.739
Sustainable environmental innovation	5	0.568
Sustainable social innovation	5	0.656
Dimensions of sustainable innovation as a whole	15	0.878
Green core capabilities	8	0.886
Green core capabilities	8	0.886
The questionnaire is complete	23	0.932

It is clear from the results of Table (5) that the Cronbach's alpha reliability values for the two dimensions of the questionnaire ranged between (0.568, 0.886), while the reliability values for the complete questionnaire were (0.932), which are high and acceptable reliability coefficients.

**Stability using the split-half method:**

A reliability test was used to determine the degree of homogeneity of the samples. The questionnaire was divided into two homogeneous groups, and the Spearman-Brown equation was used for halving. This is because the reliability coefficient of any scale can be predicted if we know the reliability coefficient for half of it. The Guttman coefficient was also used for unequal groups, as shown in Table (6).

Table (6) Correlation values for the dimensions of the questionnaire

Dimensions	Paragraphs	Spearman's coefficient	Gutman's coefficient
Sustainable economic innovation	5	0.852	0.767
Sustainable environmental innovation	5	0.814	0.659
Sustainable social innovation	5	0.852	0.767
Dimensions of sustainable innovation as a whole	15	0.856	0.854
Green core capabilities	8	0.892	0.878
Green core capabilities	8	0.892	0.878
The questionnaire is complete	23	0.968	0.933

It is clear from Table (6) that the reliability coefficient using the split-half method for the values of the Spearman-Brown coefficient was between (0.814 - 0.968), while the values of the Gettman coefficient were between (0.659 - (0.933), which are high and acceptable reliability coefficients.

### The third: Testing the research hypotheses

#### 1- Correlations between research variables

The information in this part focused on verifying the validity of the first main research hypothesis (there is a significant correlation between the sustainable innovation process and the green core capabilities variable in the laboratory, the research sample in Najaf Al-Ashraf) and the sub-hypotheses emerging from it, which show the correlation relationships between the research variables, through the use of Pearson correlation coefficient. As explained in the following:

In order to examine the relationship between the sustainable innovation variable and the green core capabilities variable, the statistical results of the Pearson correlation coefficient were used, as shown in Table (7).

Indicators Dimensions	Green core capabilities		
	Correlation coefficient value	Calculated t value	Significance level(Sig)
Sustainable economic innovation	0.774	4.380	0.000
Sustainable environmental innovation	0.564	9.549	0.001
Sustainable social innovation	0.575	8.863	0.001
Total dimensions of sustainable innovation	0.674	0.674	11.174

1-Through Table (7), the results showed that there is a strong positive relationship between the dimension of sustainable economic innovation and the green core capabilities variable, as the Pearson correlation value reached (0.774) and is statistically significant at the level of ( $p \leq 0.01$ ). Therefore, the first sub-hypothesis is accepted (there is a significant correlation Significant significance between the sustainable economic innovation dimension and the green core capabilities variable)

2- It is also clear from the table above that there is a positive relationship between the dimension of sustainable environmental innovation and green core capabilities, as the Pearson correlation value reached (0.564) and is statistically significant at the level of ( $p \leq 0.01$ ), and therefore the second sub-hypothesis is accepted (there is a significant correlation relationship Between the dimension of sustainable environmental innovation and the variable green intrinsic capabilities)

3- The results also showed that there is a positive relationship between the sustainable social innovation dimension and green core capabilities, as the Pearson correlation value reached (0.575) and is statistically significant at the level of ( $p \leq 0.01$ ). Therefore, the third sub-hypothesis is accepted (there is a significant correlation between the dimension Sustainable social innovation and variable green core capabilities)

Accordingly, from the previous table, it is clear that there is a strong correlation with high moral significance between the dimensions of the sustainable innovation variable combined and the green core capabilities. The results showed that the correlation coefficient was (0.674) and at a significant level ( $p \leq 0.01$ ), and therefore the first main hypothesis is accepted (there is a correlation There is a significant significance between the variable of sustainable innovation and the variable of green core capabilities in the laboratory, the research sample in Najaf Al-Ashraf.

## 2- Influence relationships between research variables

The information in this part was devoted to verifying the validity of the second main research hypothesis (there is a significant influence relationship for the sustainable innovation process on the green core capabilities variable in the research sample factory in Najaf). And the sub-hypotheses emerging from it, where a simple linear regression test is used to demonstrate the effect of the independent variable (sustainable innovation) on the dependent variable (green core capabilities).

To determine the validity of the second main hypothesis and the sub-hypotheses emerging from it, the results of simple linear regression were used, as in the following table:

Table (8) Statistical indicators of the impact of sustainable innovation on achieving green core capabilities (n= 34)

Indicators Dimensions	value(F)	Slope	The value of the slope constant (B)	Significance level(Sig)
Sustainable economic innovation	43.212	0.598	0.774	at 1% level
Sustainable environmental innovation	13.624	0.328	0.574	at 1% level
Sustainable social innovation	13.592	0.349	0.575	at 1% level
Total dimensions of sustainable innovation	28.393	0.496	0.698	at 1% level

From the table above it is clear that the economic innovation dimension had a positive impact on the green intrinsic capabilities variable, as the calculated (F) value was (43.212) and statistically significant at a significance level ( $p \leq 0.01$ ) and the value of the coefficient of

determination (0.598), meaning that the economic innovation dimension explains an amount of 59.8% of the variance occurring in achieving the green core capabilities variable, and the value of the regression coefficient is (0.774). This indicates that a change of (1) in the value of the economic innovation dimension leads to a change of (0.774) in achieving the green core capabilities variable, and accordingly the first sub-hypothesis is accepted (there is a significant influence relationship for the dimension of sustainable economic innovation on the green core capabilities variable).

It is also clear from the previous table that the environmental innovation dimension had a positive impact on the green intrinsic capabilities variable, as the calculated (F) value was (13.624) and statistically significant at the level of significance ( $p \leq 0.01$ ) and the value of the coefficient of determination (0.328), meaning that the environmental innovation dimension explains what The amount of 32.8% of the variance occurring in achieving the green core capabilities variable, and the value of the regression coefficient is (0.574). This indicates that a change of (1) in the value of the environmental innovation dimension leads to a change of (0.574) in achieving the green core capabilities variable. Accordingly, the second sub-hypothesis is accepted (there is a significant influence relationship for the sustainable environmental innovation dimension on the green core capabilities variable).

The results of Table (10) also show that there is a positive effect of the social innovation dimension on the green core capabilities variable, as the calculated (F) value was (13.592) and statistically significant at a significance level ( $p \leq 0.01$ ) and the value of the coefficient of determination (0.349), meaning that the social innovation dimension explains The amount of (34.9%) of the variance occurring in achieving the green core capabilities variable, and the value of the regression coefficient is (0.575). This indicates that a change of (1) in the value of the social innovation dimension leads to a change of (0.575) in achieving the core capabilities variable. Therefore, the third sub-hypothesis is accepted (there is a significant influence relationship for the social innovation dimension on the green core capabilities variable).

It is also clear from the results of Table (10) that the sustainable innovation variable, with its combined dimensions, had a positive impact on the green core capabilities variable, as the calculated (F) value was (28.393) and statistically significant at a significance level ( $p \leq 0.01$ ) and the value of the coefficient of determination (0.496), that is, The sustainable innovation variable explains (49.6%) of the variance occurring in achieving green core capabilities, and the value of the regression coefficient is (0.698). This indicates that a change of (1) in the value of sustainable innovation leads to a change of (0.698) in The value of green core capabilities and therefore the second main hypothesis is accepted (there is a significant influence relationship for the sustainable innovation process on the green core capabilities variable in the laboratory research sample in Najaf)

#### **Section Four: Conclusions and recommendations**

This section is devoted to discussing the most important conclusions and recommendations that have been reached, which are as follows:

**First: Conclusions**

- 1- The management of the researched laboratory lacks the expenses of sustainable environmental innovation, especially in the field of green spaces, pollution measurement technology, and others, due to the decline in funding resources for the industrial sector.
- 2- The researched laboratory is distinguished by the quality of the products provided to customers, which are considered to have the least impact on the environment compared to competitors, due to its following a set of procedures and behaviors that contribute to reducing environmental pollution and getting rid of harmful waste.
- 3- The researched laboratory does not have appropriate working and occupational safety conditions due to the lack of modern mechanisms to simplify work procedures and create a clean and comfortable work environment for workers.
- 4- The researched laboratory has good opportunities for growth in the markets, but it faces the entry of competitors into the markets and the inability to keep up with them, especially in terms of price policies, and this affects innovation to provide a new product.
- 5- The weakness of the technical aspect in the researched laboratory is also evident at the level of infrastructure development and at the level of its use compared to competing companies in the markets.
- 6- The results of the research proved that there is a sub-good level of interest in sustainable innovation in its various dimensions in the research sample laboratory, as the social innovation dimension ranked first, followed by economic innovation and then environmental innovation.
- 7- The research results demonstrated the existence of a strong positive correlation and a significant effect between the dimensions of sustainable innovation and the green core capabilities variable, together and individually, in the research sample laboratory in Najaf.

**Second:- Recommendations**

- 1- Motivating manufacturing organizations in general through the Ministry of Industry, especially the laboratory under research, to adopt sustainable environmental innovation behaviors as an urgent competitive strategy for our national organizations through funding the industrial sector in this field in a way that ensures improved sustainability in performance.
- 2- Maintaining the level of quality of products provided to customers as one of the dimensions of competitive advantage to outperform competitors in the markets by adopting advanced training and qualification programs for workers in the researched laboratory.
- 3- The need to be careful in adopting occupational health and safety rules in the researched laboratory through modern mechanisms to simplify work procedures and create a clean and comfortable work environment for workers.
- 4- Striving to expand the market share of the researched laboratory in light of the distinctiveness of its products compared to competitors, taking into account reviewing the price policies for the products in the researched laboratory based on competitors' prices.
- 5- The need for the factory management to develop specific mechanisms and paths to activate its capabilities in the field of information technology and disseminate knowledge and information as critical factors for success and build green core capabilities to outperform competitors.

- 5- The management of the laboratory under study must focus in a balanced manner on the components of sustainable innovation in its various dimensions (economic innovation, environmental innovation, social innovation) because of their role in achieving the core green capabilities.

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## Appendix No. (1)

## Research questionnaire form

Al-Furat Al-Awsat Technical University

Administrative Technical College / Kufa

Department of Business Administration Technologies

Mrs.....

good greeting ....

In your hands is a questionnaire about the research tagged (**The impact of adopting sustainable innovation in achieving green core capabilities, an analytical study in garments factory in alnajaf al-ashraf**). The success of the research depends on the extent of your cooperation in answering precisely and objectively the paragraphs of this questionnaire, and you have been chosen to answer the phrases contained in it. Therefore, we kindly ask you to choose the answer that you deem appropriate, as this has a significant impact on the validity of the results that will be reached, bearing in mind that the recorded data will be used for research purposes and your answer will be treated with complete confidentiality.

My sincere thanks and appreciation to you...

Researcher

Mundher Abbas Shaalan

**Part One: Personal Data**

Place a tick ( ) in front of the appropriate choice:

First: Gender

1- ( ) male

2- ( ) female

Second: Duration of service in the current job:

1- ( ) Less than 5 years.

2- ( ) From 5 years to less than 10 years.

3- ( ) 10 years and more.

Third:- Educational qualification:

1- ( ) Diploma or less

2- ( ) Bachelor's degree

3- ( ) Postgraduate studies

Fourth: Career level

1- ( ) Senior management

2- ( ) Middle management

3- ( ) Minimum management

Part Two: - Topics of the study

**The first variable: - Sustainable innovation**

<b>First: Sustainable economic innovation:</b> The laboratory was able to achieve important and fundamental improvements in the following indicators of sustainable economic innovation during the past five years compared to competitors.						
Paragraphs	Phrase	Totally agree	Agree	neutral	Don't agree	Totally Don't
		5	4	3	2	1
1	The extent to which programs are developed to improve the factory's efficiency in exploiting and investing in all types of resources					
2	Reducing the prices of the factory's products compared to competing products					
3	The level of reduction in variable production costs (wages, materials...					
4	The extent to which the factory's profitability is improved					
5	The extent of reduction in raw material consumption rates					
<b>Second: Sustainable environmental innovation:</b> The laboratory was able to achieve important and fundamental improvements in the following indicators of sustainable environmental innovation during the past five years compared to competitors:						
6	Percentage reduction in harmful waste					
7	The percentage of improvement in waste reduction rates (exhaust and production waste)					
8	The rate of improvement of environmentally friendly products and production processes					
9	The extent of improvement in sustainable environmental innovation expenditures (green spaces, pollution measurement technology...)					
10	The factory adopted programs to obtain the ISO 14001 certificate for the quality of the factory's environmental performance					
<b>Third: Sustainable social innovation:</b> - The laboratory was able to achieve important and fundamental improvements in the following indicators of sustainable social innovation during the past five years compared to competitors.						
11	The rate of improvement of programs to create a clean and comfortable work environment for employees					
12	The extent of adopting advanced training and qualification programs for workers					
13	The fairness of the system of wages, incentives and rewards					
14	The percentage of reducing work injuries					
15	Percentage of improvement in health care programs for workers					

The second variable: green core capabilities						
16	Our organization's possession of information about the outcomes of technical development and how to use them contributes to providing a new product.					
17	Our organization is working to introduce a new product to diversify its products.					
18	The entry of new competitors into the industry affects innovation in introducing a new product to our organization.					
19	Our organization works to provide new products that have never been produced before.					
20	The employees in our organization have multiple abilities and skills that contribute to providing ideas for producing new products.					
21	Our organization has an abundance of alternatives to raw materials and parts for production process inputs that lead to the introduction of a new product.					
22	The top management of our organization constantly supports research and development projects to introduce new products.					
23	Our organization introduces a new product to meet the needs and desires of customers.					