

The Impact Of External Environmental Orientation On Green Innovation- Structural Equation Modeling.

تأثير التوجه البيئي الخارجي على الابتكار الأخضر - نمذجة المعادلات الهيكلية

Salima Sallem¹, Kheira Beharef², Manal Mostefai³

¹Université Abdelhamid ibn Badis (Mostaganem), Salima.sellam@univ-mosta.dz

²Université Hassiba Ben Boualii (Chlef), k.becharef@univ-chlef.dz

³Université Mustapha Stambouli (Mascara), m.mostefai@univ-mascara.dz

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Abstract:

The study at hand aims at recognizing the effect of the external environmental orientation on the items of green innovation (green innovation in products and green innovation in operations) and the purpose behind is to evaluate the extent of this effect. To reach the potential, the focus spreads over the previous studies in order to draw a model for this study where there was a study in the field undertaken. This study included a random sample of 50 frameworks in the institution. Moreover, this inquiry used a questionnaire as a basic instrument to collect data and it relied on modeling based on the structural equations as the data analysis was done using the program smart PLS. The final results revealed that there is a positive effect of the external environmental orientation on the product of green innovation and its operations.

Key words: green innovation; product of green innovation; operation of green innovation; external environmental orientation

JEL Classification Codes:Q56, O30, P18

ملخص

الهدف من الدراسة معرفة أثر التوجه البيئي الخارجي على عناصر الابتكار الأخضر (الابتكار الأخضر في المنتجات والابتكار الأخضر في العمليات)، والغرض هو تقييم مدى أثر و للتوصل لذلك تم الاعتماد على الدراسات السابقة لبناء نموذج الدراسة، حيث قمنا بإجراء دراسة ميدانية شملت عينة عشوائية مكونة من 50 إطار في المؤسسة وقد تم الاستعانة بإستبانة كأداة رئيسة لجمع البيانات والمعلومات، واعتمدنا في هذه الدراسة على نمذجة بالمعادلات الهيكلية ومعالجة البيانات ببرنامج smart PLS ومن خلال النتائج المتحصل عليها

¹ **Corresponding author:** Becharef Kheira, e-mail: k.becharef@univ-chlef.dz.

تبيين لنا وجود أثر إيجابي للتوجه البيئي الخارجي على منتج الابتكار الأخضر وعملياته.
كلمات مفتاحية: الابتكار الأخضر، منتج الابتكار الأخضر، عملية الابتكار الأخضر، التوجه البيئي
الخارجي.

تصنيفات JEL: P18، O30، Q56

1. INTRODUCTION

There is no doubt that evolution is the most prominent feature in human life since its first appearance on the face of this earth. This development has accumulated since that first appearance at varying rates due to the great mental capacity that is distinguished by man over all the other creatures that share with him on earth, in being able to develop and invent new things. Perhaps the most important development and the greatest innovation made by man is that comprehensive civilizational development. Man has proven in all these ages that he is not only the most surviving being compared to other creatures, but he is also the most incomparably innovative.

The industrial revolution has caused great changes that have affected all the different fields of life, and modern life has become in its essence thorny and complex, and more difficult than the previous one, because achieving success requires a lot of progress in the field of science and technology and access to advanced countries, and the use of a lot of intelligence and tricks And innovation to achieve goals that are expanding day after day.

Innovative thinking is the highest level of human mental and cognitive activity and the most important educational output. In his education, the learner must be urged to produce something new or different and at the same time bear the character of his personal uniqueness. This type of thinking has received great attention from psychologists and educators, as the theories of Guilford (1950, 1956, 1959, 1967), Torrance (1962, 1965), and Ashen and Cogan 1965 dealt with the nature of this type of thinking, as well as the factors that go into its formation.

Over the decades, the progress and development of science, technology, and innovation have been restricted to the most advanced countries, with investment in research and development still below ambition in developing countries. Even with people with outstanding abilities and talents, research and development are still confined to laboratories only, far from interacting with the needs of the market and society. However, this cannot continue as the collective actions and steps taken at the local level are the primary tools for global change

From this, we pose the following forms: What is the impact of the external environmental orientation on green innovation?

2. the theoretical framework of the study

2.1 define innovation

There are many definitions that were used to define what is meant by the concept of innovation, and there is no doubt that the prevalence of the concept and its frequent use by individuals with different specializations, and different cultural frameworks led to the abundance of these definitions, with the increasing degree of ambiguity of this concept. The following is a presentation of the most important definitions that dealt with the concept of innovation:

- Innovation is the process by which a new product or idea is transformed into concrete action. (Khair din, 2015, p. 10)

- Sayed Khairallah (1974) defined it as the process that results in solutions and ideas that depart from the well-known cognitive framework that we have (the traditional framework), with the aim of the emergence of new ideas, and the process of innovative thinking requires four basic aspects:

- ☐ A high degree of awareness of problems that may not raise many ordinary people.

A high degree of fluency, i.e. the ability to produce as many responses as possible to a single question.

- ☐ A high degree of flexibility, ie the ability to produce as many diverse ideas as possible.

- ☐ A high degree of originality, that is, the ability to produce as many new, unconventional ideas as possible.

Guilford stated that innovative thinking is due to those abilities that are characterized by innovative people, and these abilities determine whether a person has the ability to show innovative behavior to a noteworthy degree or not. It is a production with new relationships characterized by novelty and diversity, which Rogers defines, and arises from the interaction of the individual with the environment. (Ali Aboudi Nima, 2016, pp. 171-172).

Table 1. Definitions of Innovation

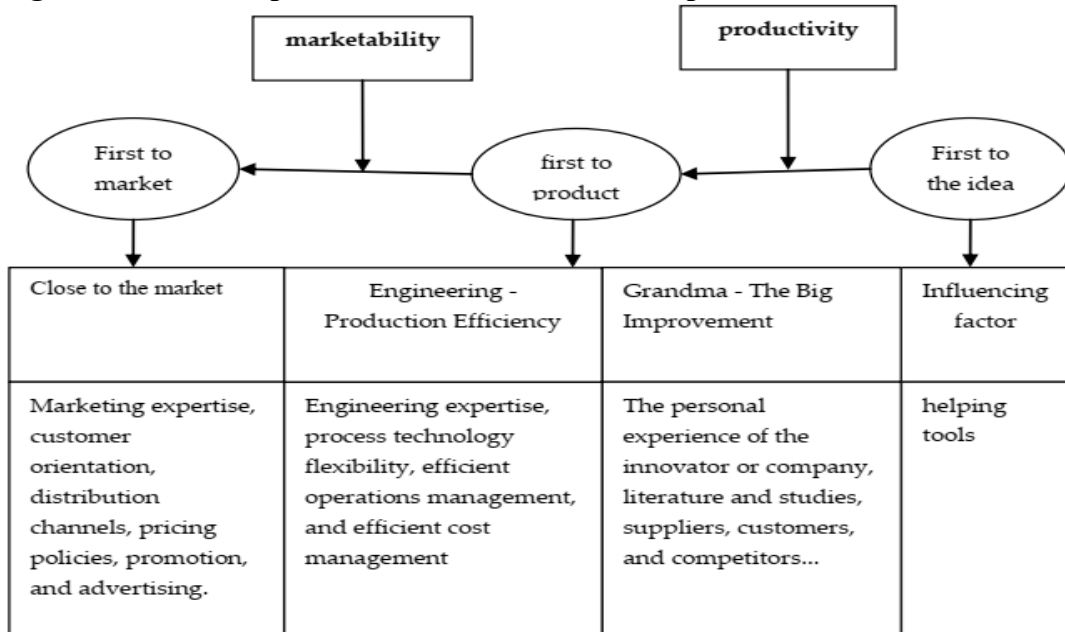
Author	the definition	Notes
Synde & Daurte 2003	Create unique solutions for customers	Increasing emphasis in engineering companies (hardware industry) to provide new solutions to the needs of customers.
D. Simonton1999	An original idea or product that is adopted	In the cyclical model of innovation, it is not enough that innovation only brings new things, but that it also works.
J. Schumpeter Cited in : Margherita and Grippa	It is the creation of new combinations in its five forms: new products, new production methods, new markets, and new sources of supply of materials.	
Runco and Pritzker 1999	Creativity is thinking about new things while innovation is doing new things.	Although the two seem to have a sequence where thinking precedes doing things, they are not subject to simple linear succession because they are overlapping and interacting with each other.
A.Furnham 2008	Creativity is a process related to individual creative work, while innovation is related to work in an organizational context	Creativity is concentrated in the stage of ideas and may be related to literary and artistic creation, while innovation is the transformation of an idea into a new thing (product or service).
V.Sathe	The process of creating new products or processes for existing or new markets.	New products increase profitability while new processes lower costs, improve quality, and can introduce new products.

Source: najm Abboud najm. (2015). Leadership and innovation management. Amman. Dar Al-Safa Publishing and Distribution. p 143 (written in arabic)

From all of this, we summarize our definition of innovation as the company's ability to come up with new things that add more value and are faster than competitors in the market.

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Figure 1. The concept of innovation - first to idea, product, and market



Source: najm Abboud najm. (2015). Leadership and innovation management. Amman. Dar Al-Safa Publishing and Distribution. p 145 (written in Arabic)

3. green innovation concept

Green innovation is defined as the innovation of products or production processes aimed at addressing environmental problems arising in the product life cycle. (Jun Jei, 2011, p. 16)

It is also defined as that innovation that includes innovation in green products and green processes, which relate to technological, organizational, social, and institutional changes that contribute to justifying the environmental burdens resulting from production processes. (Guoyou, 2013, p. 3)

3.1 Green Innovation Elements According to the previous definition, it is clear that green innovation focuses on two main components, namely the green product and green processes, which can be defined as follows:

3.1.1 Green product: It is the process of modifying the use of natural resources and primary resources in line with environmental requirements and standards, and modifying existing production processes to reduce spoilage through production processes and reduce pollution levels to the lowest possible degree, as well as the possibility of benefiting again from its waste by re-collecting, treating and classifying them.

Green product aims to conserve energy and various natural resources, which include products or services that conserve energy and reduce the use of

fuel and resources, as well as reduce pollution. Its importance is highlighted by its ability to conserve resources, as green products have the least amount of environmental impact at all stages of the product's life cycle and the possibility of green products being recycled. (Ahmed Abde, 2018, p. 358)

3.1.2. Green product: This type of innovation refers to the modification of manufacturing processes and systems to produce environmentally friendly products that achieve environmental goals. So it can be said that it is the use of innovative ways to reduce the negative environmental impacts of production processes, that is, it includes activities that reduce emissions or hazardous waste during manufacturing, and the recycling of waste and emissions in order to reuse it and reduce the consumption of energy and raw materials. (Baseer & Amer, 2019, p. 139)

3.2 Importance of Green Innovation: The importance of green innovation is highlighted by its interest in reducing pollution, improving environmental performance, improving resource productivity, increasing energy efficiency, and reducing waste. As well as reducing production costs. (Ahmed Abde, 2018, p. 357)

The essence of green innovation is to improve the environmental efficiency of the product through functional innovation in the stage of generating new ideas for the product. It is also considered a vital solution to overcome pressures from customers, competitors and regulatory bodies, and it also has a major role in promoting and activating green growth. (Baseer & Amer, 2019, p. 137)

4. ENVIRONMENT

4.1 ITS CONCEPTS:

- The United Nations Conference in Stockholm in 1982 defined it as: “The stock of material and social resources available at a given time and place to satisfy human needs and aspirations. (Mohamed Zaki, 2000, p. 47)
- According to Algerian legislation (Law No. 03-10): The environment consists of natural, abiotic resources such as air, air, water, land, subsoil, plants, and animals, including the genetic heritage and the forms of interaction between these resources, as well as places, landscapes and natural landmarks.
- The environment, in its comprehensive global perspective, is also defined as all the elements that make up this planet or affect it. The environment is the natural formation of the earth and what it contains in its interior or on its surface of groundwater or surface, and what grows in it of human, animal, and plant life, and from the gaseous layers And what it covers, talking about the environment is talking about life itself, which is affected by the action of nature on the one hand, and by the action of the human being who lives this life on the other hand. (Kamel, 2001, p. 131).

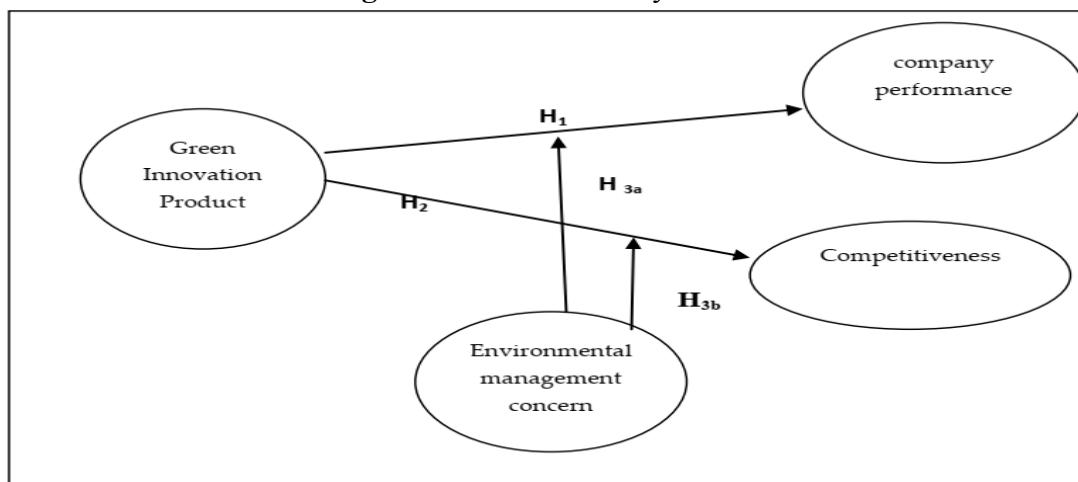
4.1 environmental orientation: Environmental orientation refers to a company's position on environmental conservation that may affect its relationships with external stakeholders, including suppliers, government, and society. (Menguc & Ozanne, 2005, pp. 430–438) And because the environmental orientation reflects the way and the internal climate of the company that responds to environmental issues of interest to various stakeholders (Chen & al, 2015, pp. 479–500) There are two types, internal environmental orientation, which focuses on the internal efforts of companies committed to protecting the environment, while external environmental orientation focuses on managing relationships with companies and external stakeholders. (Banerjee, 2002, pp. 177–191)

5. previous studies

- ilker murat ar study titled the impact of green product innovation on firm performance and competitive capability: the moderating role of managerial environmental concern 2012

This research paper attempted to study the impact of the green innovation product on the performance of the company and enhance competitiveness and study the role of the rate variable represented in the environmental management interest in this relationship, and the study model was built through previous studies and by collecting 140 questionnaires from a sample consisting of industrial companies in Turkey in various sectors The data was analyzed using structural equations modeling and the molar form illustrates the model used in this study.

Figure 2. shows the study model



Source: Ilker Murat Ar study titled The impact of green product innovation on firm performance and competitive capability: the moderating role of managerial environmental concern 2012 .p 856

The study consisted of four hypotheses revolving around the relationship between green innovation, company performance, competitiveness, as well as the role of the modified variable represented in environmental management interest in modifying the relationship. The study reached the following results:

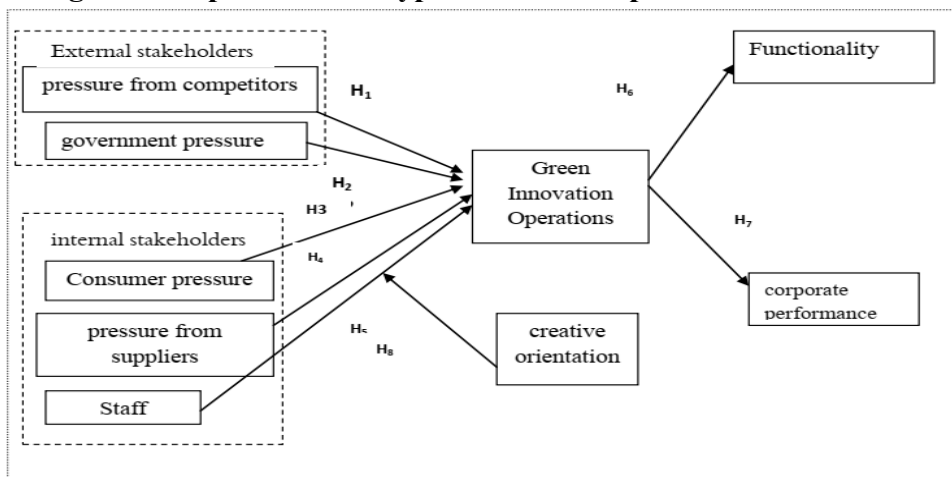
- The green innovation product positively affects the company's performance variable and competitive ability, in addition to the role of the modified variable (environmental management concern) in modifying the relationship by increasing it between green innovation and performance, i.e. the relationship between them increases with the presence of environmental management interest on the part of managers, and the relationship between the two variables is the innovation product. Green and competitiveness are not affected by the environmental management concern variable.

- Hua-Huny et al. study entitled Effects of Green Innovation on Environmental and Corporate Performance: A stakeholder Perspective in 2015

This study examined the impact of a number of factors and consequences on green innovation in terms of performance, with the adoption of stakeholder theory on corporate green innovation practices and determining how green innovation practices affect the environment and business performance.

A research model based on hypotheses to determine the correlation between variables using a sample of 202 service and industrial companies in Taiwan. The study consisted of 8 hypotheses represented in the following model:

Figure 3. Represents the hypotheses that represented the model.



Source: Hua-Huny et al. study entitled Effects of Green Innovation on Environmental and Corporate Performance: A stakeholder Perspective in 2015. p 5014

The hypotheses were tested using the structural equations method, and the results of the study concluded that there is a positive impact of competitors

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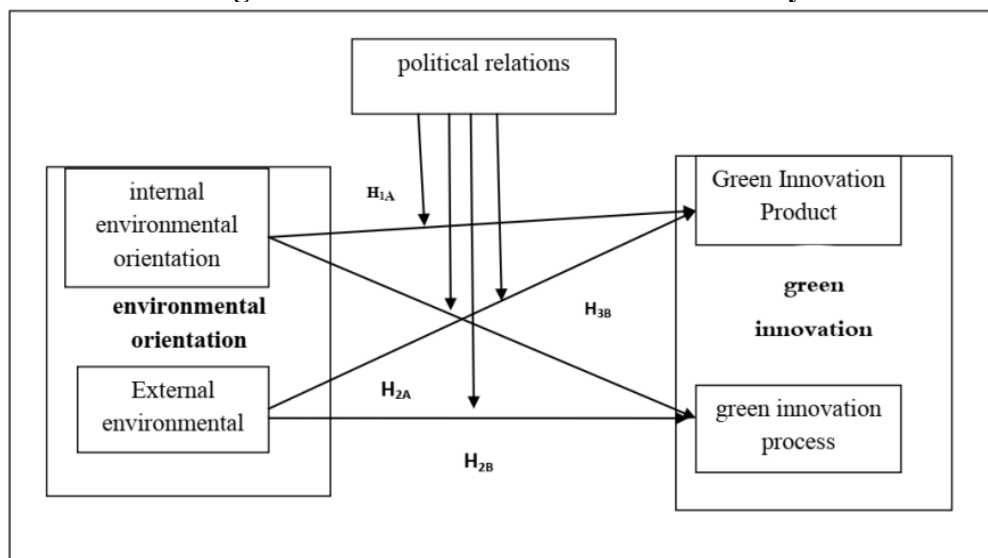
and government pressure on employee behavior on green innovation practices. Creative has a relationship between green innovation processes and employee behavior, which contributes to an increase in environmental performance and company performance.

- Tiwari et al.'s study, The Effect Of Environment Orientation On Green Innovation: Do Political Ties Matter? 2018

The study aimed to know the impact of two types of environmental orientation on green innovation and the role of the political relations variable as a modified variable. The study included 253 Chinese industrial enterprises, representing 28.4% of public institutions and 52.2% of private institutions, while companies with foreign investment amounted to 19.4 %.

The problem of the study consisted of 08 hypotheses, and the following figure illustrates the study model:

Figure 4. Shows the model used in the study



Source: Tiwari et al.'s study, The Effect Of Environment Orientation On Green Innovation: Do Political Ties Matter? 2018.p03

Factor analysis, regression, and correlation were used to analyze the results and the study reached the following results: There is a relationship between the internal and external environmental orientation with the green innovation product and its processes, and the impact of the internal environmental orientation on the green innovation process is strong compared to the green innovation product, in addition to the role of the modified variable represented in Political relations in strengthening the positive relationship between the internal environmental orientation variables and the green innovation process and its product, as it reduces the relationship

between the external environmental orientation and the green innovation process.

6. Application Framework

In order to shed light on the reality of green innovation in enterprises and the impact of the external environmental orientation, we conducted an experimental study at the enterprise level using modeling with structural equations to test the study hypotheses:

Table 2. the research hypotheses and objectives

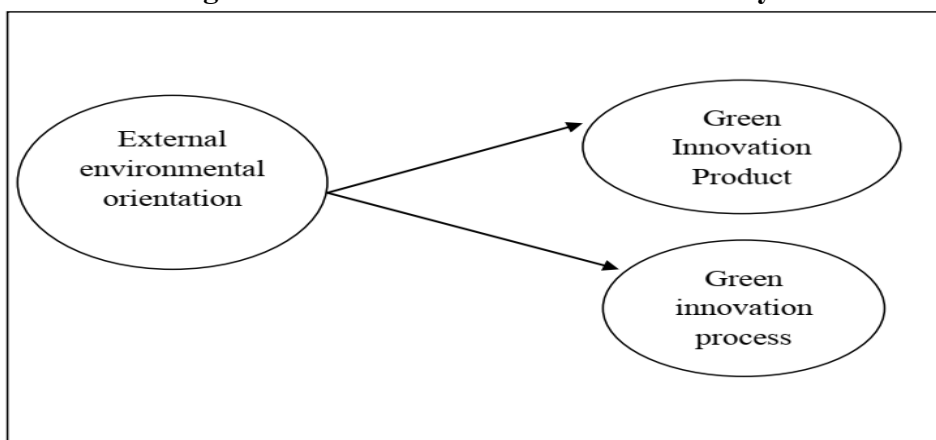
Objectives	Hypotheses
H1: The external environmental orientation has a positive impact on the green innovation product. H2: The external environmental orientation has a positive impact on the green innovation process.	Testing the impact of external environmental orientation on green innovation

Source: Prepared by the researchers

Study population and study sample:

The population of our study consisted of 04 industrial establishments , By distributing 50 questionnaires to the officials (institution's frameworks) . 45 study-able forms were retrieved. And a questionnaire of 15 questions using a five-way Likert and building the questionnaire based on a study (Liwei & al, 2018, pp. 1-15)

Figure 5. Shows the model used in the study



Source: Prepared by the researchers

The method used:

Structural Equation Modeling:

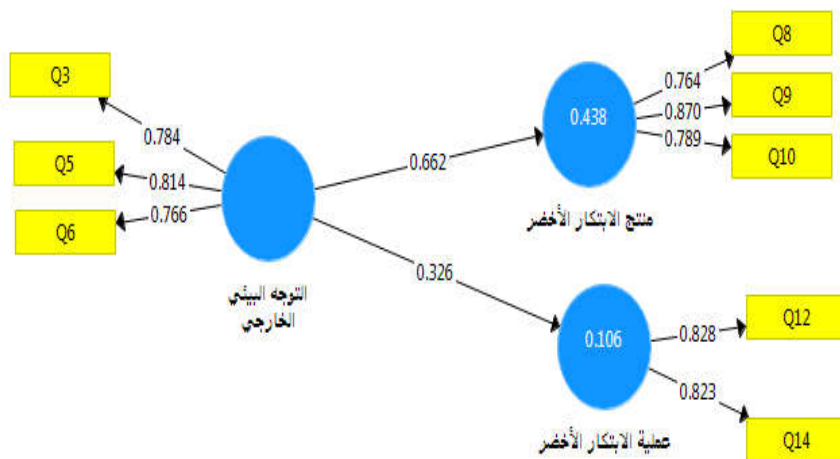
- Test the quality of a measurement model (external model)

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The study model includes 15 questions (item) for 3 variables represented in the external environmental orientation variable and the green innovation variable that is of two types: product and process.

After testing the quality of the measurement model is an essential step to ensure that the measurements are reliable and valid before proceeding with the analysis of the study model and hypothesis testing.

Figure 6. The result of measuring the external model, factor loading



Source: smart pls 3 program

Table 3. shows the results of measuring the external model, Factor Loading

question code	internal consistency
Q3	0.784
Q5	0.814
Q6	0.766
Q8	0.764
Q9	0.870
Q10	0.789
Q12	0.828
Q14	0.823

Source: Prepared by the researchers

It is considered an important test to ensure that there are no problems between the measured questions (CrossLoading), On this basis, the discriminatory validity coefficients in this study confirm that they are significant and statistically acceptable, and this indicates that there is a difference between the latent variables.

Thus, there is no similarity and each latent variable represents the same. composite reliability CR.

Table 4. External Model Measurement (CR Composite Reliability)

Variable	Composite Reliability INDEX
External environmental orientation	0,831
Green innovation product.	0,850
green innovation process	0,811

Source: Prepared by the researchers

The CR value must exceed 0.7 to confirm that the constructive indicators reflect the latent variable according to hare et al. in 2011. In our study, the CR value exceeded the recommended limit of 0.7 and ranged between 0811 and 0.850.

Table 5. shows the results of the analysis of the AVE measurement model.

variable	AVE INDEX
External environmental orientation	0.621
Green innovation product.	0.654
green innovation process	0 .682

Source: Prepared by the researchers

it turns out that all AVE coefficients are statistically significant and acceptable, as all values are greater than 0.50 according to Fronell & Lacker's in 1981, which indicates that each latent variable explains more than half of the variances of its indicators.

Table 6. Cross Loading (Discriminant Validity).

variable	External environmental orientation	Green innovation product.	green innovation process
External environmental orientation	0,788		
Green innovation product.	0,326	0,826	
green innovation process	0,662	0,286	0,809

Source: Prepared by the researchers

It is an important test to ensure that there are no problems between the cross-loading questions. On this basis, the discriminatory honesty coefficients in this study confirm that they are significant and statistically acceptable, and this indicates that there is a difference between the latent variables and therefore lack of similarity and that each latent variable represents the same

Inner Model Testing :

We will conduct five tests to evaluate the internal model according to China in 2010, Hair et al. in 2011

Table 7. Index of the coefficient of determination R2.

latent variable	R ²
Green innovation product.	0.690
green innovation process	0.438

Source: Prepared by the researchers

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It turns out that the R²coefficient is significant and statistically acceptable in this study, So that the independent latent variables represented by green innovation explain an estimated 70% of the dependent latent variable (external environmental orientation). The variable of the green innovation product explained its value as 30%, while the green innovation process explained its value as 40%.

Table 8. the index f²

latent variable	f ²
Green innovation product.	0.779
green innovation process	0.191

Source: Prepared by the researchers

It turns out that all f² coefficients are statistically significant and acceptable, as the green innovation product index is greater than 0.35, according to Cohne in 1998, as he is interested in explaining the interpretation of each independent variable separately.

That is, the green innovation product variable had an 80% effect on the external environmental orientation, while the green innovation process index amounted to 0.191, i.e. 20% impact on the environmental orientation variable, meaning the impact is considered small, according to the researcher Cohane.

Table 9. the index Q²

latent variable	SSO	SSE	Q ² = $(1 - \frac{SSE}{SSO})$
External environmental orientation	93,000	93,000	0,330
green innovation process	63,212	62,000	
Green Innovation Product	86,848	93,000	

Source: Prepared by the researchers

This indicator is the ability of the study model to predict (how many independent variables have the ability to measure the dependent variable) The coefficient of Q² is statistically acceptable because it is greater than 0 according to Grotch in 2001, The two variables, the green innovation product and process, have the ability to predict the dependent variable by 33%.

GOF Quality of Conformity Index:

Calculation of Quality of Conformity Index:

$$GOF = \sqrt{(\overline{R^2} \times \overline{AVE})}$$

An index equal to 0.586 is higher than 0.36, according to Wetzels in 2009, which indicates the quality of the proposed model

.Hypothesis testing.

Table 10. shows the research hypotheses test.

Hypotheses	Relationship	Sta beta	std euree	T Value	P Value
H ₁	External environmental orientation green innovation product	0 .201	0 .308	1,195	0,000
H ₂	External environmental orientation Green innovation process	0,658	0,662	0,082	0,000

Source: Prepared by the researchers

Through the results of this study, the external environmental orientation has a positive impact on the green innovation product, as well as on the green innovation process.

7. CONCLUSION

Through this study, we tried to identify the extent of the impact of environmental orientation on green innovation through a standard study and by using modeling with structural equations for a sample consisting of enterprise officials and to know their opinions on this subject.

Because the environment provides opportunities for green innovation and improvement of conditions, whether internal or positive, as the environment in which the institution is established plays a major role in the innovation process. To preserve the environment through the use of less dangerous materials and reduce the consumption of water and electricity, as well as coal and oil, there is an institution that is distinguished by studying product that is easy to recycle and reuse, so that the sample of our study sees that the process of preserving the environment is everyone's responsibility and seeks Strive to maintain it and it is vital to the survival of the institution.

Through our study, we reached a set of results and recommendations, the most important of which are:

- The institutions under study should pay attention to green innovation, by informing workers and officials of the aspects that support green innovation for products as well as green innovation for processes.

- Putting the environmental aspect among the priorities of institutions to preserve them, by supporting green innovation.

- Seeking to use environmentally friendly means, and trying to provide products that are not harmful to it.

- Setting laws by the government that stipulate penalties for every institution that harms the environment,

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- Conducting competitions between environmental preservation institutions and encouraging them about that.
- Encouraging institutions to innovate green and providing them with financial and technical assistance.

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