



**HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE  
SCIENCES**

**ECO-INNOVATION AND BUSINESS PERFORMANCE IN  
JORDANIAN SMALL AND MEDIUM ENTERPRISES  
OPERATING IN THE FOOD PROCESSING SECTOR**

DOI: 10.54598/005350

Theses of Doctoral (PhD) dissertation

Reham Al-Hanakta

Gödöllő, Hungary

2024

## **Hungarian University of Agriculture and Life Sciences**

### **Name of Doctoral School:**

Doctoral School of Economic and Regional Sciences

### **Discipline:**

Management and Business Administration

### **Head of Doctoral School:**

Prof. Dr. Zoltán Bujdosó PhD, Full Professor  
Hungarian University of Agriculture and Life  
Sciences

### **Supervisor:**

Prof. Dr. Anna Dunay PhD, Full Professor  
John von Neumann University

.....  
Approval of Head of Doctoral School

.....  
Approval of Supervisor

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## 1. INTRODUCTION

Countries' competitiveness depends on the ability of their enterprises to innovate, Upgrade, and introduce new products and services. Therefore, innovation is the dynamic component that drives economies forward.

Small and medium-sized enterprises (SMEs) create the foundation of economic growth and social development in all countries worldwide and developing countries. They help to increase production capacity and contribute to eliminating the problems of poverty and unemployment. Those kinds of businesses became strategic goods in many countries.

Innovation creates an enabling environment that facilitates taking advantage of the capabilities of people, processes, and technology. It is a systematic approach to facilitate process design, evaluation, justification, and integration. Innovation can also be defined as the methodology of managing, allocating, and timing organizational technology tools, workforce assets, and work processes to achieve a given output efficiently and expediently. (Badiru, 2020)

The innovation process is taking part in the Jordan market, but still not in a very perceptible way. Jordan urgently requires enhancing innovations and entrepreneurship, considering the rising emergency bills and the rapidly growing refugee community. On the other hand, few companies in Jordan appreciate and recognize the power of ideas and research outside their community. (Dutta et al.,2022)

(96%) of the total corporate economy in Jordan is the economy of Small and Medium-sized Enterprises (SMEs); the successive Jordanian governments have also been keen to enhance Jordan's Economic competitiveness, as they have taken serious steps to enhance leadership. Through their institutions. In 2019, the Ministry for Digital Economy and

Entrepreneurship was established to "support entrepreneurship and innovation in Jordan." Based on its belief in the importance of entrepreneurship and creativity and the necessity to provide supporting components and encourage creative ideas and talents as they have a significant role in achieving sustainable development.

The subject of "green innovation," or "eco-innovation," has received unparalleled international and national legislative attention. Given the latter's role in promoting and supporting small and medium enterprises on the one hand and, On the other hand, it is associated with achieving the sustainable development process of protecting the environment (Sáez-Martínez et al., 2016)

So green innovation or eco-innovation is considered a basis for supporting and promoting small and medium enterprises, given the development that the latter has known. After it aimed to achieve performance or economic effectiveness, it became necessary for its commitment to achieving environmental performance because of the emergence of what is known as the "environmental responsibility" that falls on these institutions if they do not consider the environmental performance (Bag et al., 2022)

Based on the sustainable development concept, economic growth gradually enables emerging economies to close the gap with more developed economies. Activities that develop an economy in transition may include increasing living standards, developing a competitive industrial and commercial base, and improving infrastructure.

It is important to note that eco-innovations must not necessarily be technical but may include process innovations such as introducing new product lifecycles. Firms today need systemic approaches to sustainability to

be competitive in the long term. Without a diligent effort to create an organizational infrastructure that supports the development of a sustainability strategy, the firm's efforts to successfully implement a sustainability strategy will be severely hindered.

Researchers show a range of advantageous and disadvantageous characteristics for Eco-innovation and broader sustainability issues in (SMEs). For instance, resource constraints (Lack of time, personnel, financial capital, or knowledge) may result in a reluctance to invest in and implement eco-innovations. On the other hand, lean and flexible organizational structures may allow for fast responses to customer and market demands for eco-innovations. Identifying an (SME's) specific eco-innovation strategy helps to understand why it chooses to engage in eco-innovation. For example, increasing the eco-efficiency of their production processes influences organizational, product, and process innovations. (Hansen and Klewitz, 2012).

In practice, there are various types of eco-innovation, including product innovations, process innovations, organizational innovations, and marketing innovations. While each type of innovation has its own attributes, determinants, and contribution to environmental performance, researchers have cautioned that it is not effective to implement innovation programs separately without a systemic view. (Damanpour et al., 2009)

The food processing sector directly affects human health in terms of nutrition and in terms of food hazards. Medium and small companies can only advance well and become sustainable if their human resources are well trained and educated on food safety measures and laboratory testing. Although this sector is highly regulated and regularly monitored by the Jordan Food and Drug Administration (JFDA), it is composed of many

informal small businesses – home businesses, farm businesses or small shops selling dairy products, Arabic sweets, jams, pickles, etc. – mostly distributed around Amman and in the governorates. There is a definite tendency to hire more women in certain activities requiring tolerance and intensive manual work, as well in quality control activities.

According to the 2021 year's data provided by the General Department of Statistics of Jordan, the food processing, agricultural, and animal husbandry sectors currently employ 52,143 people and generate 4.10 billion Jordanian dinars in income (output).

The current relevance of the sector is attributed to the fact that it is highly diversified, including all sizes of businesses. Also, this relevance is derived from the forward and backward linkages of the sector in the economy, its degree of integration and the added value generated as a result of these linkages. The sector represents 25.9% of the net added value within Jordan's industrial economy. Therefore, the sector has become a strategic one both in industry and agriculture. (Hundaileh and Fayad, 2019)

Business performance is related to accomplishing certain outcomes by transforming the inputs into outputs. The organization's main goal is to increase their performance to meet the competitive market. There is a variance measurement developed by scholars to measure the organization's performance like return-on-investment ROI, market share, profitability, and sales.

Eco-innovation development benefits all companies facing the conflict between economic development and environmental protection. Therefore, companies need to prepare their products and adopt environmental innovation as the best way to improve environmental management

performance and meet environmental regulations' requirements. (Chen et al., 2012)

Environmental innovation and performance have a positive impact on costs, sales of distinctive products, profit margins, brand value, and the company's standing in the community in addition to lowering environmental risks. Designs that consider economic, social, and environmental factors are among the advancements in environmental regulation. (Shah and Ahmad, 2019)

Because of this, decision-makers need to understand that adopting environmental innovation is now the only way for businesses to develop and expand. Many local and foreign clients and buyers require that their suppliers make items that do not include harmful and poisonous substances as environmental innovation has become more crucial for businesses to enhance environmental awareness. Businesses are likewise looking for ways to produce goods with less energy and material input. (Vaitoonkiat and Charoensukmongkol, 2020)

## **1.1 Problem Statement**

Over the past few decades, corporate environmental responsibility has grown significantly. However, the research was primarily concerned with high-tech businesses and industries. With very few exceptions, the academic literature on this subject tends to ignore small and medium-sized firms (Díaz-García et al., 2015). Small businesses are typically unenthusiastic about incorporating environmental issues into their management processes because they find it challenging to transform ecological practices into competitive advantages. (Cuerva et al., 2014).

Additionally, traditional industries like the food sector, normally low-tech with significant exceptions, lack research on this subject. Because of this, it is still uncertain if adopting ecological practices can improve the performance of businesses engaged in low-tech industries like the food sector (Stucki, 2019)

Measures used to assess enterprise performance have generally focused on profitability and sales. Moreover, in today's globally competitive environment, performance is being evaluated from a broader perspective. Because performance measurement influences strategic decision-making at the enterprise, only financial performance measurements are inadequate in contemporary organizations (Atnafu and Balda, 2018)

Consequently, businesses must be able to measure their performance holistically and analyze themselves by the established criteria. As a result, evaluating some parameters in terms of customers and society - receiving service from the business- is essential to determine a business's performance level. In a nutshell, performance is measured as the sum of all business stakeholders' performance (Shad et al., 2019).

## **1.2 Research Objective**

This research will examine the effects of Eco-innovation on Jordanian SMEs in the food sector, and enhance SMEs' performance, toward a theoretical framework and testing empirically the relationship between practices and capabilities and eco-innovation in SME performance.

Jordan is a small developing Arab country in the Middle East; Jordan's economy benefits from its well-educated population, strategic location, world-heritage touristic sites, and reputation for stability in a turbulent region. The innovation process is taking part in the Jordan market, but not in

a very noticeable way, even though the government actively supports innovation by launching a strategy for innovation.

- The research will assess the contribution of Eco-innovation to Jordanian SME performance in food sector.
- SMEs often encounter more difficulties developing technological capability because of the resource restraints on capital and talents and the considerable risk of R&D & itself. These barriers have become an opportunity for growth and development for SMEs since they are moving toward a stage of maturity and consolidating themselves in the new era of the knowledge economy. Therefore, the research will study the Eco-innovation effect on SME performance. (Halme et al., 2016)
- Drivers for the adoption of eco-innovation to factors that affect companies directly or indirectly, internally, or externally.

### **1.3 Research Hypotheses**

Studying how innovation drivers impact eco-innovation behavior and business performance has grown in significance for SMEs in recent years. Therefore, we postulate the following hypothesis.

H1: There is a positive impact of Technological capabilities (TC) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H2: There is a positive impact of Environmental organizational capabilities (EOC) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H3: There is a positive impact of Command and control (CCI) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H4: There is a positive impact of Market based instruments (MBI) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H5: There is a positive impact of Customer green demand (CGD) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H6: There is a positive impact of Competitive pressure (CP) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H7: There is a positive impact of Eco – innovation on Business Performance (Economic performance, Environmental performance, Social performance) in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H7.1: There is a statistically significant effect at level ( $\alpha \leq 0.05$ ) of Eco – innovation on Economic performance in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H7.2: There is a positive impact of Eco – innovation on Environmental performance in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H7.3: There is a positive impact of Eco – innovation on Social performance in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.

H8: There are insignificant differences of the respondents' response toward the study's variables regarding different organization type.

H9: There are insignificant differences of the respondents' response toward the study's variables regarding different organization size.

H10: There are insignificant differences of the respondents' response toward the study's variables regarding different organization age.

## 1.4 Theoretical model

The theoretical model of the research, the factors influencing eco-innovation and the impacts on economic, social and environmental performance, as well as the study hypotheses are summarized by Fig. 1.

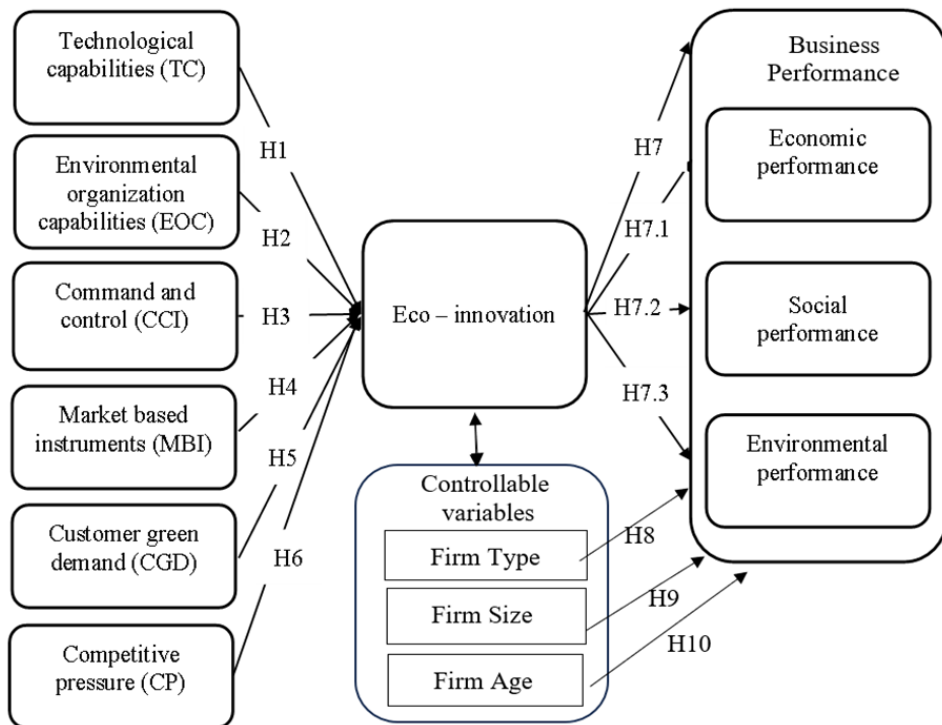


Fig. 1: Theoretical model of the study

Source: own compilation

Resource-Based theory provides an excellent theoretical basis to discuss the contribution of resources and competencies to performance in each of the three kinds of eco-innovation.

The resource-based theory suggests businesses respond to external change based on their internal resources and abilities. An institutional theory emphasizes external pressures and social expectations to explain a business's innovation behaviors.

This examination of the firm's resources is based on the idea that these resources are the foundation for developing capabilities and competencies and, as a result, creating the competitive advantage of the commercial enterprise (Kruesi and Bazelmans, 2022)

## **2. MATERIALS AND METHODS**

### **2.1 The Study Population**

The targeted population in this study is in the Food Processing Sector. The total population in the Food Processing Sector is about (500) employees at all levels.

### **2.2 The Study Sample**

The researcher chose to take appropriate distributed sample (500) questionnaires for the employees of junior, senior and Managerial in the Food Processing Sector, which represent the study population using Google forms. A total of 357 questionnaires were retrieved from the distributed questionnaires; all of them are valid for statistical analysis purposes, and their percentage was 71.4% of the sample size.

## 2.3 Data Collection Methods (Tools)

To achieve the goal of the study, two types of sources were used to obtain the necessary data to conduct the study, namely:

**First: Secondary sources:** They are the scientific sources (literary and theoretical) on which the researcher relied in obtaining the necessary data to prepare the theoretical aspect of the current study and to enhance its objectives by reviewing its noticeable results and preparing them. The study tool develops hypotheses for the study and enriches the discussion process. These sources will be books, university theses, scientific research, articles, refereed periodicals, and various publications dealing with academic topics in both Arabic and English.

**Second: Primary Sources:** These are the sources that the researcher used to obtain the primary data from the study community, which are necessary to prepare the practical side of the current study. These sources were represented in the questionnaire which was prepared and developed through literature review and previous studies, which covered all aspects covered by the theoretical framework and questions. The hypotheses on which the study was built and through which the researcher aims to identify study sample members opinions the opinions. attitudes about the study model dimensions and variables.

## 2.4 Questionnaire Design

The questionnaire consists of two main parts:

**Part One:** relates to the demographic information of the study sample member including: The primary industry of your company, the total number of employees, the age of the company.

**Part Two:** includes questions related to the study variables (technological capabilities, environmental regulation capabilities, command and control tool, Market based tool (MBI), Green customer demand, competitive pressure, Environmental innovation / environmental product, Environmental innovation process, Organizational environmental innovation, Business performance Economic performance, social performance) environmental performance (46) questions. The researcher relied on a five-point Likert scale to measure all variables to benefit from the respondents' perceptions, which consist of points ranging from 5 (strongly agree) to 1 (strongly disagree).

## **2.5 Data Collection and Statistical Analysis**

### ***2.5.1 Normality***

The normality assumption is made if the Kolmogorov-Smirnov significance is greater than 5%. Since all variables have more than 5% significant values.

### ***2.5.2 Validity***

Pearson correlation coefficient ( $r$ ) test was used to assess if there is correlation between factor's groups or not. The test results usually fall between zero where no relationship between two variables and one which represent the perfect relationship (Pallant, 2005).

Pearson coefficient range between 1 and -1 whereas the correlation strength can be qualified by using the following index:

1.  $r = 0.1$  to  $r = 0.29$  or  $r = -0.1$  to  $r = -0.29$  (Small).
2.  $r = 0.3$  to  $r = 0.49$  or  $r = -0.3$  to  $r = -0.49$  (Medium).
3.  $r = 0.5$  to  $r = 1.00$  or  $r = -0.5$  to  $r = -1.00$  (High). Pallant, J. (2005).

Table 1: Pearson Principal Component Factor Analysis for Variables

No.	Variable	Factor 1
1	Technological capabilities (TC)	0.791
2	Environmental organization capabilities (EOC)	0.805
3	Command and control instrument (CCI)	0.701
4	Market-based instrument (MBI)	0.628
5	Customer green demand (CGD)	0.788
6	Competitive pressure (CP)	0.821
7	Product eco-innovation	0.651
8	Process eco-innovation	0.737
9	Organizational eco-innovation	0.797
10	Economic performance (ECP)	0.657
11	Social Performance	0.763
12	Environmental performance	0.760

Source: own research

### ***2.5.3 Reliability***

Cronbach's alpha is a coefficient used to assess items' internal consistency or reliability; it shows how closely the items are related to one another and how free from bias they are (Sekaran and Bougie, 2016). Reliability is presumed if Cronbach's alpha value is greater than 70% for all variables. Cronbach's Alpha coefficients for all variables are more significant than 70% in the sample.

### ***2.5.4 Statistical processors***

The Statistical Package for Social Sciences (Spss26) program will be used to conduct these analyses and statistical tests. To achieve the purposes of the study, the following statistical methods were used:

### ***2.5.5 Descriptive statistics***

To display the characteristics of the sample members and describe their answers, by using the following:

1- Percentage: The percentage will be used to measure the relative frequency distributions of the characteristics of the sample members and their answers to the questionnaire statements.

2- Arithmetic mean: The arithmetic mean will be used as the most prominent measure of central tendency to measure the average of the auditors' answers to the questionnaire questions.

3- Standard Deviation: The standard deviation will be used as one of the measures of dispersion to measure the deviation in the answers of the members of the community from their arithmetic mean.

### ***2.5.6 Analytical statistics:***

1- Multiple Regression Analysis, which will be used to show the effect of the independent variables on the dependent variable.

2- Line Simple Regression Analysis Test, which will be used to show the effect between the independent variable and the dependent variable.

Significance level ( $\alpha$ ): (0.05) will be adopted as the upper limit for the level of moral significance. Therefore, if the significance level is (0.05) or less, there are statistically significant differences. However, if the significance level is greater than (0.05), there are no significant differences—in statistical and significant effect tests.

### 3. DATA ANALYSIS AND RESULTS

#### 3.1. Demographic Profile

Table 2: Demographic data of the research sample

Variables	Frequency	Percentage
<b>Your Company Main Industry</b>		
Animal feed	5	1%
Bakery and Arabic sweets	15	4%
Cocoa, chocolate and sugar confectionery	40	11%
Dairy products	30	8%
Other food products	151	42%
Processed and preserved meat	101	28%
Processing and preserved fruits and vegetables	15	4%
<b>Total number of employees</b>		
5-25	181	51%
25-50	30	8%
50-100	25	7%
>100	121	34%
<b>Age of Company</b>		
less than 3	272	76%
3-5	15	4%
5-10	35	10%
>10	35	10%

Source: own research

#### 3.2. Study Variables Analysis (Descriptive Analysis)

Descriptive analysis includes mean, standard deviation, t-value, importance, and rank. The importance is divided into three levels as follows:

The importance is calculated based on the following criteria:  $5-1/3 = 1.33$  (interval) as follows:

- 1- Low degree: between 1 and 2.33 ( $1 + 1.33 = 2.33$ ).
- 2- Medium degree: lies between 2.34 and 3.66 ( $2.33 + 1.33 = 2.34 - 3.66$ ).
- 3- High degree: lies between 3.67 up to 5.

### ***3.2.1 The drivers of Eco-innovation***

To assess and rank the drivers of eco innovation, respondents were asked to evaluate a set of statements categorized under a set of variables:

- Technological capabilities (TC),
- Environmental organization capabilities (EOC),
- Command and control instrument (CCI),
- Market-based instrument (MBI),
- Customer green demand (CGD) and Competitive pressure (CP).

The first ranked group as a highest important group is “Command and control instrument (CCI)” where the least ranked group is “Market-based instrument (MBI)”.

Table 3: Impact the drivers of eco-innovation

<b>Items</b>	<b>Mean</b>	<b>St.D.</b>	<b>Imp.</b>
Total Command and control instrument (CCI)	3.96	0.712	High
Total Market-based instrument (MBI)	2.99	0.957	Medium

Source: own research

### ***3.2.2 Eco-innovation***

To assess and rank eco-innovation, respondents were asked to evaluate a set of statements categorized under a set of variables: Eco-innovation/ Product eco-innovation, Process eco-innovation, and Organizational eco-innovation. The first ranked group as the highest important group is “Process

eco-innovation,” whereas the least ranked group is “Organizational eco-innovation.”

Table 3: Impacts on eco-innovation variables

Items	Mean	St.D.	Imp.
Total Process eco-innovation	3.74	0.768	High
Total Organizational eco-innovation	3.23	0.855	Medium

Source: own research

### 3.2.3 Business Performance

To assess and rank business performance items, respondents were asked to evaluate a set of statements categorized under variables: Economic performance (ECP), Social Performance, and Environmental performance. The first ranked item as the highest factor is “Environmental performance,” whereas the least ranked item is “Economic performance.”

Table 3: Impacts on performance types

Items	Mean	St.D.	Imp.
Total Economic performance (ECP)	3.44	0.644	Medium
Total Environmental Performance	4.07	0.641	High

Source: own research

## 3.3. Testing Study Hypothesis

### - Normal Distribution (Histogram)

Skewness and kurtosis statistics are used to determine a distribution's normality. Skewness statistics are used to test the symmetry of distributions. On the other hand, the Kurtosis statistic is used to determine how heavy the distribution tails are (Kuvın et al., 2003). The skewness of the study

variables ranges between -2 and 2, indicating that they are normally distributed.

#### - **Linearity Test:**

The Durbin-Watson test is used to ensure the independence of errors. The model does not violate this assumption if the Durbin-Watson test value is about 2. At the same time, VIF (Variance Inflation Factor) and tolerance are used to test multicollinearity. If VIF is less than 10 and tolerance is more than 0.05, the multicollinearity model does not violate this assumption.

The Durbin-Watson value is ( $d=1.533$ ), which is around two, which means that the residuals are not correlated; therefore, the independence of errors is not violated. The VIF values are less than 10 and the tolerance values are more than 0.05.

#### - **The Main Hypotheses**

Simple linear regression analysis was performed to test the Main hypotheses (H1, H2, H3, H4, H5, H6).

#### **Impact test results H1**

Table 4: Results for Hypothesis 1

<b>D.V</b>	<b>Model Summary</b>		<b>ANOVA</b>		<b>Coefficients</b>			
	<b>R</b>	<b>R<sup>2</sup></b>	<b>F</b>	<b>Sig F*</b>	<b>B</b>	<b>standard error</b>	<b>T</b>	<b>Sig T*</b>
environmental innovation	0.641	0.410	247.181	0.000	0.628	0.040	15.722	0.000

\*The effect is statistically significant at the level ( $\alpha \leq 0.05$ )

Source: own research

The R-value of the first dimension was (0.641), which indicates a positive correlation between the dimension (Technological capabilities (TC) and the dimension (environmental innovation). The result of the coefficient of

determination is ( $R^2 = 0.41$ ), which means that the (Technological capabilities (TC) domain explained (41%) the variance in (environmental innovation) when all other variables remain constant. It was also proved that at the level of confidence ( $\text{sig} = 0.000$ ), the value of (F) reached (247.181), which confirms the importance of the regression at the level of significance ( $\alpha \leq 0.05$ ).

Accordingly, the hypotheses are accepted: "There is a statistically significant effect at level ( $\alpha \leq 0.05$ ) of Technological capabilities (TC) on environmental innovation in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector".

### Impact test results H2

Table 5: Results for Hypothesis 2

D.V	Model Summary		ANOVA		Coefficients			
	R	R <sup>2</sup>	F	Sig F*	B	standard error	T	Sig T*
environmental innovation	0.641	0.411	247.558	0.000	0.528	0.034	15.734	0.000

\*The effect is statistically significant at the level ( $\alpha \leq 0.05$ )

Source: own research

### Impact test results H3

Table 6: Results for Hypothesis 3

D.V	Model Summary		ANOVA		Coefficients			
	R	R <sup>2</sup>	F	Sig F*	B	standard error	T	Sig T*
environmental innovation	0.598	0.357	197.415	0.000	0.573	0.041	14.050	0.000

Source: own research

### Impact test results H4

Table 7: Results for Hypothesis 4

D.V	Model Summary		ANOVA		Coefficients			
	R	R <sup>2</sup>	F	Sig F*	B	standard error	T	Sig T*
environmental innovation	0.534	0.285	141.659	0.000	0.380	0.032	11.902	0.000

Source: own research

### Impact test results H5

Table 8: Results for Hypothesis 5

D.V	Model Summary		ANOVA		Coefficients			
	R	R <sup>2</sup>	F	Sig F*	B	standard error	T	Sig T*
environmental innovation	0.612	0.375	213.042	0.000	0.475	0.033	14.596	0.000

Source: own research

### Impact test results H6

Table 9: Results for Hypothesis 6

D.V	Model Summary		ANOVA		Coefficients			
	R	R <sup>2</sup>	F	Sig F*	B	standard error	T	Sig T*
environmental innovation	0.665	0.442	280.758	0.000	0.517	0.031	16.756	0.000

Source: own research

To test the Main hypotheses (H7), Multiple regression analysis was performed.

Table 10: Results of Multiple Regressions Analysis (H7)

I.V	Model Summary		ANOVA		Coefficients				
	R	R <sup>2</sup>	F	Sig F*	variable	B	St. error	T	Sig T*
Eco – inno- vation	0.747	0.558	148.318	0.000	Econ. P.	0.202	0.047	4.332	0.000
					Envir. P	0.232	0.066	3.490	0.001
					Social P.	0.534	0.049	10.869	0.000

Source: own research

The values of the regression coefficients for the sub-dimensions of the variable (Business Performance). It is clear from the table that the value of B in the dimension of Economic performance amounted to (0.202). The value of T calculated in this dimension was (4.332) at a significant level (0.000), which is less than 0.05, which indicates a significant positive effect at the significance level ( $\alpha \leq 0.05$ ). It is clear from the table that the value of B in the Environmental performance dimension was (0.232), and the value of T calculated in this dimension was (3.490) with a significance level of (0.001), which is less than 0.05, which indicates a significant positive effect at ( $\alpha \leq 0.05$ ). It is clear from the table that the B value in the social performance dimension was (0.534), and the T value was calculated at (10.869) with a significance level of (0.000), which is less than 0.05, which indicates a significant positive effect at ( $\alpha \leq 0.05$ ).

### 3.4. Summary of the results

The results of the analysis showed the following:

- There is agreement on the high average importance of technological capabilities (TC) elements, where the importance and arrangement of technological capabilities appear, as it is easy for companies to obtain innovative environmental advisory services from (planning, evaluation, and training.).

- There is agreement on medium importance. Elements of Environmental Regulation Capabilities (EOC), where companies create rules to guide environmental management.
- There is agreement on the importance of (CCI) components, as products must meet the requirements of international environmental regulations.
- There is agreement on the intermediate importance of Market-Based Instruments (MBI) components, where the government is concerned with environmental protection policies.
- The results indicate agreement on the medium importance of green customer demand (CGD) elements, as the environment is an essential issue for corporate customers.
- There is an agreement on the importance of the elements of competitive pressure(CP), which gives companies a competitive advantage through environmental concepts.
- There is agreement on the medium importance of eco-innovation/products, high importance of eco-innovation components of the process, and medium importance of organizational eco-innovation components.
- The existence of an agreement about the average importance of items of economic performance allows the company to provide sustainable value to the consumer.
- There is an agreement on the high and medium importance of the elements of social performance, as the company guarantees health and safety at work.
- Having an agreement on the high environmental importance of the performance elements, the company gives priority to the cleanest and least harmful production in the environment.

#### **4. NEW SCIENTIFIC RESULTS**

New scientific results either challenge old scientific results and provide new approaches or support the former findings in different aspects. These results could help to develop new strategies for companies to implement eco innovation and determine the most effective drivers for inducing eco innovation in SMEs in the Jordanian food sector.

The research develops a model that illustrates the relative significance of each type of eco innovation in business performance.

The theoretical framework mixes the resource-based theory and institutional economics to examine the complexity of factors stimulating eco-innovation decisions as well as performance. by pointing out the internal factors that companies can manage to fully adopt eco innovation. While companies have minimum control of external factors, they can go beyond mere compliance when adhering to internal factors. These factors, identified in the business literature and part of our conceptual model, can lead companies to change to a more sustainable performance.

The examination of environmental regulation as two individual components (a command-and-control instrument and a market-based instrument) also leads to valuable insights and various implications for researchers and policymakers. Academic research has an important role in enhancing sustainability and innovation orientation, providing decision-makers, managers, and policy makers alike, with tools that can be helpful in the process of implementation and adaptation to new strategies.

1. I have demonstrated that the drivers (TC, EOC.CCI.MB, CGD, CP) have a favorable effect on environmental innovation in Jordanian small and medium-sized businesses engaged in the food processing industry.

after performing statistical analysis using ANOVA. The study's findings confirmed the significance of these drivers.

2. I have proved that correlation coefficient indicates an effect of Eco–innovation on Business Performance and that the independent variable (Eco–innovation) on Business Performance is statistically significant.
3. My research results confirm that the regression coefficients for the sub-dimensions of the variable (Business Performance). which indicates a significant positive effect at ( $\alpha \leq 0.05$ ). of Eco – innovation on Business Performance (Economic performance, Environmental performance, social performance) in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector.
4. The study found that firm size and firm age don't show any significant effect, this evidence suggests that the potential connections and complementarities between Eco innovation and business performance depend primarily and critically on the organizational capabilities and coordination mechanisms that firms are able to implement instead of on the size or age of the organizations.

Therefore, the results are in line with the Natural Resource-Based theory postulates and complements other contributions that also use a firm-level approach to environmental innovation analyze the determinants of environmental innovation activities. In this sense, our work takes a complementary perspective and a closer look to the inner mechanisms of the firm that explain the environmental innovation success.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

### **5.1. Conclusions**

- The hypotheses (H1, H2, H3, H4, H5, and H6) that are used to evaluate and rank the factors that drive eco-innovation range in importance from very important to moderately important.
- H7 was approved regarding how eco-innovation variables affect business performance. Eco-process has the biggest impact on business performance, followed by eco-product and eco-organizational, in that order. The hypothesis was confirmed, and the impact of eco-innovation factors on business performance was ranked.
- Accordingly, the sub-hypothesis accepted: "There is a statistically significant effect at level ( $\alpha \leq 0.05$ ) of Eco-innovation on Economic, Environmental and Social performance in Jordanian Small and Medium Enterprises Operating in the Food Processing Sector".
- The hypotheses (H8, H9, H10) proved that there is no statically significant difference in respondents' responses towards study variables regarding different organization types, size and age.

### **5.2. Recommendations**

Based on the results, the study recommends the following:

- Companies need to have some successful experience in the field of environmental innovation in order to support their technological capabilities; their R&D team must have more mature and robust design capabilities.

- Importance of Attention Environmental Regulatory Capabilities (EOC), companies have been awarding bonuses to people contributing to energy conservation and emissions reduction.
- The companies' production processes must meet the requirements of the International Environmental Regulations to support the Command-and-Control Instrument (CCI).
- Pay attention to a preferential tax policy on environmental innovation the government provides to support a market-based instrument.
- Attention to the customer's green demand Since valued customers often raise environmental issues, customers have specific demands on environmental issues.
- Attention to competitive pressure (CP) for companies by increasing market share through environmental concepts.
- Supporting Product eco-innovation so that the company produces recyclable, reusable, and recoverable products.
- The company needs to participate in operating processes that meet environmental standards in the process of eco-innovation.
- The company's suppliers must undergo an environmental assessment before selecting to support organizational eco-innovation.
- Supporting the company's economic performance (ECP) through a sustainable increase in the cost of the product.
- Companies need to increase employee training in environmental innovation and sustainability as a way to pay attention to social performance.
- Companies must develop green competencies to manage their environmental impact.

- Policymakers must consider that the food industry's SMEs' motivations for adopting eco-innovation are unaffected by the firm's size or age, so they must assist these SMEs in putting eco-innovation into practice.
- Managers of SMEs in Jordan's food sector must focus on internal and external capabilities and resources, as neither firm size nor age determine the impact of eco innovation in their businesses.

### **5.3. Further Research**

- It is necessary to restore and use agricultural and processing methods which allow for the return to a high content of nutrients in food. The Jordanian food economy demands a paradigm shift. Such need stems both from the very low biological and health quality of some products, but also from the need to safeguard the agricultural environment effectively.
- It is well-known that water and food security are two significant priorities for Jordan as a whole, and by default for the agriculture sector. A prolonged plan has been developed to implement initiatives in these areas to continue progress and to improve the situation largely. The sector has also developed plans to expand productivity and water efficiency on existing farms, improve local production, food security and storage capacity and maintain forests and biodiversity.
- Developing relations between academia and industry to boost applied research requires collaboration with universities that provide technical assistance in production, waste management, risk assessment , quality assurance, reduction of product contamination, improve consistency, increase efficiency, reduce waste or energy consumption and Provision Clean production, good manufacturing, and hygiene practices.

- More consideration should be paid to the significance of long-term support for those SMEs during their pursuit of sustainability. Research should be directed to having an elevated understanding of the impacts of the industry's norms and values. It would be also interesting to analyze the impact of direct contact with end-consumers.
- The prompt growth of social media and platforms such as Facebook, Twitter, and Instagram among firms from diverse industries proposes the possibility for social manufacturing, and widely spreading eco-innovation awareness. Future studies could therefore study differential impacts of social media incorporation on online and offline involvement in eco-innovation awareness. Other studies could concentrate on the role of social media and social manufacturing within different eco innovation networks. Surplus insights may appear from in-depth analysis of social constructs.
- The deployment of quantitative questionnaires embraces promise in investigating the implication of motivations, their influence on behavioral intentions, and how they might be affected by variables such as age (across diverse ranges), gender, cultural contexts, and other intervening factors. This process will drive the field forward and offer more thorough understanding of the intricate web of consumer motivations within the context of eco-innovative foods.

#### **5.4. Research Limitation**

- The limitations of the research are related to the location (Jordan, food sector, SMEs), time as the research was conducted in the time frame (November 2022 till April 2023) and the procedural tool (questionnaire).
- One of the key limitations in this type of study is the source of the data because the gathered information is collected from the managers and

staff of the surveyed companies, which can sometimes lead to bias. Future studies could consider the participation of customers.

- Most of the reviewed studies are based on the so-called variance theories, which deliver enlightenments for the phenomena in terms of relationships among dependent and independent variables argued that, although quantitative analyses are usually considered more demanding and objective than qualitative analyses, they are less able to portray the relevance of the local institutional and socioeconomic context. Quantitative analyses regularly establish general relationships and thus omit critical variables of the determinants for innovation/adoption of specific eco-innovations. There has been change in the use of a combination of quantitative and qualitative methods to acquire greater perceptions into the process of eco-innovation.
- Drivers can be either decisive or contributing factors of eco-innovation implementation and development. The synthesized findings of the study are primarily built on quantitative method, and thus investigate the relative strength of certain factors that act as motivators or catalysts of certain eco-innovation types, while their decisiveness stays a topic for further analysis. Moreover, some eco-innovation drivers need to grasp more interest in research.

## 6. REFERENCES

- Atnafu, D., Balda, A., 2018. The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence from micro and small enterprises in Ethiopia. *Cogent Business & Management* 5, 1503219.
- Badiru, A.B., 2020. *Innovation: A Systems Approach*. CRC Press, Boca Raton. <https://doi.org/10.1201/9780429200281>
- Bag, S., Dhamija, P., Bryde, D.J., Singh, R.K., 2022. Effect of eco-innovation on green supply chain management, circular economy capability, and performance of small and medium enterprises. *Journal of Business Research* 141, 60–72.
- Chen, Y.-S., Chang, C.-H., Wu, F.-S., 2012. Origins of green innovations: the differences between proactive and reactive green innovations. *Management Decision* 50, 368–398.
- Cuerva, M.C., Triguero-Cano, Á., Córcoles, D., 2014. Drivers of green and non-green innovation: empirical evidence in Low-Tech SMEs. *Journal of Cleaner Production* 68, 104–113.
- Damanpour, F., Walker, R.M., Avellaneda, C.N., 2009. Combinative Effects of Innovation Types and Organizational Performance: A Longitudinal Study of Service Organizations. *Journal of Management Studies* 46, 650–675. <https://doi.org/10.1111/j.1467-6486.2008.00814.x>
- Díaz-García, C., González-Moreno, Á., Sáez-Martínez, F.J., 2015. Eco-innovation: insights from a literature review. *Innovation* 17, 6–23.
- Dutta, S., Lanvin, B., Wunsch-Vincent, S., León, L.R., World Intellectual Property Organization, n.d. *Global innovation index 2022:: (subtitle) /. Unknown*. <https://doi.org/10.34667/TIND.46596>
- Halme, M., Kourula, A., Lindeman, S., Kallio, G., Lima-Toivanen, M., Korsunova, A., 2016. Sustainability innovation at the base of the pyramid through multi-sited rapid ethnography. *Corporate Social Responsibility and Environmental Management* 23, 113–128.
- Hansen, E., Klewitz, J., 2012. The Role of an SME's Green Strategy in Public-Private Eco-Innovation Initiatives: The Case of Ecoprofit. *Journal of*

Small Business & Entrepreneurship 25, 451–477.  
<https://doi.org/10.1080/08276331.2012.10593584>

Hundaileh, M.L., Fayad, M.F., 2019. Jordan's food processing sector—analysis and strategy for sectoral improvement. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn and Eschborn.

Sáez-Martínez, F.J., Díaz-García, C., Gonzalez-Moreno, A., 2016. Firm technological trajectory as a driver of eco-innovation in young small and medium-sized enterprises. *Journal of Cleaner Production* 138, 28–37.

Shad, M.K., Lai, F.-W., Fatt, C.L., Klemeš, J.J., Bokhari, A., 2019. Integrating sustainability reporting into enterprise risk management and its relationship with business performance: A conceptual framework. *Journal of Cleaner production* 208, 415–425.

Shah, S.Z.A., Ahmad, M., 2019. Entrepreneurial orientation and performance of small and medium-sized enterprises: Mediating effects of differentiation strategy. *Competitiveness Review: An International Business Journal*.

Stucki, T., 2019. Which firms benefit from investments in green energy technologies? –The effect of energy costs. *Research Policy* 48, 546–555.

Vaitoonkiat, E., Charoensukmongkol, P., 2020. Interaction effect of entrepreneurial orientation and stakeholder orientation on the business performance of firms in the steel fabrication industry in Thailand. *Journal of Entrepreneurship in Emerging Economies*.

## 7. LIST OF PUBLICATIONS

### Journal publications

1. **Al-Hanakta, R.**, Hossain, M.B., Pataki, L. and Dunay, A., (2023): Eco-innovation influence on business performance in Jordanian micro, small and medium enterprises operating in the food processing sector. *PloS One*, 18(2), p.e0281664. <https://doi.org/10.1371/journal.pone.0281664> (Scopus Q1, 3,7 IF)
2. Hossain, M.B., **Al-Hanakta, R.Y.**, Hervie, D.M., Nor K.M. and Illes, C.B., (2022): Exploring the Key Success Factors for Sustainable E-Commerce Adoption in SMEs. *Polish Journal of Management Studies*, 25(1), pp.162-178. DOI: 10.17512/pjms.2022.25.1.10 (Scopus Q3, WoS Indexed)
3. **Al-Hanakta, R.**, Illés, B.C., Dunay, A., Abdissa, G.S. and Khalife, M.A., (2021): The effect of innovation on small and medium enterprises: a bibliometric analysis. *Visegrad Journal on Bioeconomy and Sustainable Development*, 10(1), pp.35-50. <https://doi.org/10.2478/vjbsd-2021-0008>
4. **Al-Hanakta, R.**, Illés, C.B. and Dunay, A., (2021): Intermediaries motivating eco-innovation in Jordanian small and medium-sized enterprises. *Economic Annals-XXI*, 191. (7-8(1)), pp. 88-99. <https://doi.org/10.21003/ea.V191-07> (Scopus Q3, WoS Indexed)

### Book of proceedings

1. **Al-Hanakta, R.**, Sótonyi, T., Illés, B. Cs. (2023): Eco-innovation as a driver of business performance. pp. 22-26. In: Albrychiewicz-Słocińska, A., Karczewska, A., Skiba, Ł. (eds) 12th International Conference on Management - "Sustainability-Security-Quality". Book of Proceedings, Wydawnictwo Politechniki Czestochowskiej, Poland. DOI: 10.17512/CUT/9788371939563/03
2. **Al-Hanakta, R.**, Horuz, D. (2020): Innovation and growth Aspirations of startups and Entrepreneurs in Jordan In: Miomir, Stanković; Vesna, Nikolić (eds.) 2nd Virtual International Conference Path to a Knowledge Society-Managing Risks and Innovation Niš, Srbija: Research and Development Center "IRC ALFATEC", Niš, Serbia Complex System Research Centre, Niš, Serbia 374 p. pp. 95-104., 10 p.

3. **Al-Hanakta, R.**, Horuz, D., Corekcioglu, S. (2020): Sustainable Innovation Development in Jordanian SMEs And Startups In: Dimitar, Kirilov Dimitrov; Dimitar, Nikoloski; Rasim, Yilmaz (eds.) Proceedings of XIV. International Balkan and Near Eastern Social Sciences Congress Series on Economics, Business and Management-Plovdiv / Bulgaria, September 26-27, 2020. Пловдив, Bulgaria: Visshe-uchilishhe-po-agrobiznes-i-razvitie-na-regionite-Plovdiv) pp. 404-412.
4. Corekcioglu, S., Horuz, D., **Al Hanakta, R.** (2020):The Effect of International Trade on Poverty and Economic Growth In: Dimitar, Kirilov Dimitrov; Dimitar, Ikoloski; Rasim, Yilmaz (eds.) Proceedings of XIV. International Balkan and Near Eastern Social Sciences Congress Series on Economics, Business and Management-Plovdiv / Bulgaria, September 26-27, 2020. Пловдив, Bulgaria: Visshe-uchilishhe-po-agrobiznes-i-razvitie-na-regionite-Plovdiv) pp. 422-426.
5. Horuz D., Çörekçiöğlu, S., Raskovski, S., **Al Hanakta. R.** (2020): The Effect of Sustainability and Social Responsibility Approaches of Companies on Financial Performance in Turkey In: Stanković, Miomir; Nikolić, Vesna (eds.) 2nd Virtual International Conference Path to a Knowledge Society-Managing Risks and InnovationNiš, Srbija: Complex System Research Centre 374 p. pp. 235-239.
6. Horuz, D., Çörekçiöğlu, S., **Al Hanakta, R.** (2020): The Fact of Cultural Dimensions in the HR of Multinational Companies In: Dimitar, Kirilov Dimitrov; Dimitar, Nikoloski; Rasim, Yilmaz (eds.) Proceedings of XIV. International Balkan and Near Eastern Social Sciences Congress Series on Economics, Business and Management-Plovdiv / Bulgaria, September 26-27, 2020 Пловдив, Bulgaria: Visshe-uchilishhe-po-agrobiznes-i-razvitie-na-regionite-Plovdiv pp. 101-109.
7. **Al Hanakta, R.** (2019): Gender of Managers at the Ministry of Education and its Relation to Their Creative Thinking, In: Rusko, M.; V., Kollár (eds.) Sustainability - Environment - Safety 2019. Proceedings of the 9th International Scientific Conference. Pozsony, Slovakia, Žilina, Solna, Slovakia: STRIX (2019) 226 p. pp. 153-163.

### **Book Chapter:**

1. **Al-Hanakta, R.,** Zsigmond, T. (2021): HRM és COVID–19 Jordániában – Az alkalmazkodástól a válságkezelésig In: Kőműves, Zsolt Sándor; Szabó, K.; Szabó-Szentgróti, G. Poór, J. (szerk.) Koronavírus-válság kihívások és HR-válaszok – hazai és nemzetközi tapasztalatok 2020. Wolters Kluwer Hungary Kft. Budapest, 318 p. pp. 193-199.

### **Conference Abstract**

1. Zsigmondová, A.; Zsigmond, T., **Al-Hanakta, R.** (2021): HRM és COVID-19 - Jordániai tapasztalatok nemzetközi összehasonlítás tükrében: HRM and COVID-19 - Experiences in Jordan in The Light of International Comparison. p. 14. In: Szabó, Szilvia; Kiss, Ferenc; Poór, József (szerk.) CRANET Online Konferencia 2021 Program Budapesti Metropolitan Egyetem, Budapest, 19 p.