

The impact of Green Training in enhancing of Green Innovation practices for corporate operations: Evidence from foods industries in Iraq

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Abstract:

This study aims to test the impact of green training on promoting green innovation practices within State company for food Industries in Iraq. The study was based on the hypothesis that there is a statistically significant relationship between the level of green training employees receive and the level of adoption of green innovation practices in production and administrative processes. The sample size was determined using a Morgan table, and the questionnaire was distributed electronically via the social media channels of the surveyed companies to ensure it reached the largest possible number of employees. The study relied on a combination of theoretical data drawn from the literature published in prestigious scientific journals, along with field data analyzed using Smart PLS to test the hypothesized model and its hypotheses.

The results showed a significant and positive impact of green training on promoting green innovation practices, confirming the importance of investing in developing employees' environmental knowledge and skills. The study concluded that green training contributes to raising employees' efficiency in adopting clean production techniques, reducing waste, and improving the overall environmental performance of companies. Based on the results, the study recommended increasing the training budget allocated to green programs and promoting a culture of sustainable learning within companies, ensuring that green innovation is embedded as a component of long-term corporate strategy.

Keywords: Green training, green innovation, food industries, Iraq, sustainability.

1. Introduction

Green training has become a modern issue occupying a prominent position in management and marketing thought [1]. It is viewed as a strategic tool for enabling organizations to achieve their environmental goals and enhance their competitiveness in light of the global challenges facing the contemporary world due to climate change, environmental pollution, and the depletion of natural resources [2]. Today's world no longer focuses solely on economic growth in isolation from the environment; rather, environmental sustainability has become a fundamental pillar in all areas of business, production, and marketing [3]. Hence, the concepts of green marketing and green innovation have emerged as scientific and practical answers to these challenges [3]. Green marketing refers to the adoption of environmentally responsible practices in product design and marketing that align with the aspirations of environmentally conscious consumers, while green innovation relates to organizations ability to develop Eco- friendly products, processes, services, and technologies that reduce the negative impact of economic activity and enhance sustainable added value [4]. However, achieving green innovation requires investment in human capital by raising employee awareness and developing their skills and behaviors toward green practices [5]. This makes green training a pivotal approach to building an organizational culture that supports sustainability. Green training contributes to providing employees with the necessary environmental knowledge, developing their capabilities to deal with clean technologies, and motivating them to find creative solutions to the environmental challenges facing the organization [6]. Global literature has confirmed that organizations that invest in green training achieve better results in the areas of green innovation and competitiveness [7]. However, Arab and Iraqi literature in particular remains limited in this field, creating a knowledge gap that requires in-depth applied studies [8]. This issue is increasingly important in the food industry, as it is one of the sectors with the greatest impact on the environment through water and energy consumption, waste production, and emissions, in addition to its direct connection to food security and public health [9]. In this context, the State Company for Food Products in Iraq is gaining significant importance as one of the leading companies in the food industry. However, it faces challenges related to the need to develop its operations and products to keep pace with sustainability requirements and global market practices [10]. This highlights the research problem represented by the lack of institutional interest in green training programs and the lack of clarity about their impact on promoting green innovation within the company [11]. This raises the main question: To what extent does green training contribute to promoting green innovation at the State Company for Food Products? The theoretical significance of this research lies in enriching the Arabic literature on green marketing and sustainable human resource management by examining the relationship between green training and green innovation in the rarely studied Iraqi context. Practically speaking, it provides practical results that help the State Company for Food Products and similar companies design green training programs that contribute to enhancing innovation and developing Eco- friendly products and processes [12]. It also seeks to raise the environmental awareness of employees and consumers, which positively impacts sustainable development. The research aims to achieve the study's objective of exploring the nature of the relationship between green training and green innovation within the State Company for Food Products, leading to the formulation of practical recommendations that contribute to activating this role [13]. Based on this objective, the research hypothesizes that green training has a statistically significant impact on green innovation [14]. To verify this, the research adopts a descriptive and analytical approach by reviewing relevant theoretical literature, along with an applied approach by collecting data from the State Company for Food Products using appropriate research tools such as questionnaires and interviews. The data will also be analyzed using appropriate statistical methods to test hypotheses and verify the hypothesized relationships. The research gap stems from the fact that most previous studies have addressed training and development in general, without focusing on green training as an independent variable and its direct relationship with green innovation as a dependent variable, particularly in the Iraqi corporate environment [15]. This research seeks to fill this gap by presenting a new applied framework in the food industry sector. It is expected that this research will contribute to enriching the Arabic literature with a model that can be built upon in the future, enhancing the capacity of Iraqi institutions to address environmental challenges through

investment in green human capital, and paving the way for subsequent research addressing other sustainability-related issues such as environmental accounting, social responsibility, and green consumer behavior [16]. Thus, the research does not merely discuss the theoretical dimensions of training and green innovation, but rather seeks to provide a real applied contribution capable of guiding institutional policies and programs towards a more sustainable path [17].

2. Literature Review and Hypothesis Development

2.1. Green Training

Green training is a multidimensional concept in contemporary management literature. Researchers have approached it from different perspectives, reflecting the diversity of its objectives and functions [18]. Some view it as a cognitive tool aimed at raising employees' awareness of environmental issues and providing them with the information necessary to understand the impact of economic activity on the environment, thereby enhancing their awareness of their responsibilities toward sustainability [19]. Others define it as a behavioral practice that seeks to instill positive attitudes among employees toward adopting green work patterns, such as reducing waste and rationalizing resource use [20]. From another perspective, green training is presented as a skills approach that develops technical and administrative competencies related to the use of clean technology and the implementation of sustainable production systems [21]. Some researchers also view it as a cultural element that contributes to instilling environmental values within organizational culture, thus strengthening employees' convictions about the value of sustainability as an integral part of the organization's identity [22]. The strategic approach in the literature emphasizes that green training represents a competitive tool that enables organizations to achieve green innovation and compliance with environmental legislation, as well as reduce costs resulting from waste and pollution [23]. Hence, it becomes clear that green training is not a single concept, but rather an integrated framework that combines knowledge, behaviors, skills, and values, enhancing organizations' ability to address environmental challenges and achieve their sustainable goals [24].

2.2. Green Innovation

Green innovation is a fundamental concept in the literature of sustainable management and environmental marketing [25]. Studies have approached it from multiple perspectives, reflecting the diversity of its practices and impacts [26]. Some view it as a product innovation, embodied in the design of environmentally friendly goods based on natural or recyclable raw materials, characterized by energy efficiency and low emissions [27]. Other researchers believe that green innovation is embodied in production processes, through the introduction of new technologies and methods aimed at improving resource efficiency [28] and reducing waste and pollution at all stages of production [29]. From a third perspective, green innovation is presented as a marketing innovation, embodied in the development of marketing strategies that enhance consumer awareness of environmental issues [30] and encourage them to adopt green behavior, through sustainable packaging, environmental certifications, or awareness messages in advertising campaigns [31]. Some literature also emphasizes the organizational and administrative dimension of green innovation, as it is linked to an organization's ability to restructure its administrative systems [32] formulate sustainability-supportive policies, and adopt a green organizational culture that encourages employees to be environmentally innovative [33]. The concept also extends to a strategic dimension, as green innovation represents a tool for achieving a sustainable competitive advantage by combining economic performance with environmental protection [34]. Therefore, green innovation is a complex concept that integrates product, process, marketing, and organization, reflecting its comprehensive approach to sustainability issues [35].

2.3. Relationship between Green Training and Green Innovation

The relationship between green training and green innovation is a key focus in sustainable management literature. Research indicates that investing in employee training on environmental practices directly contributes to enhancing their ability to innovate and adopt environmentally friendly solutions [36]. Green training provides employees with the necessary knowledge about clean production techniques, instills green behaviors [37] and develops their skills in using resources efficiently, creating a work environment conducive to innovation in products, processes, marketing,

and organization [38]. The environmental culture disseminated by training also raises employees' awareness of the strategic value of sustainability, motivating them to seek innovative ways to reduce environmental impact and maximize competitive advantage [39]. Therefore, green training is viewed as a practical approach to embedding green innovation in organizations [40]. Therefore, the study's main hypothesis is:

(H1): Green training has a significant and positive effect on green innovation at the General Company for Food Products.

3. Research Methods

3.1. Measures

In this research, a five-point Likert scale was used to measure the study variables, with responses ranging from 1 = strongly disagree to 5 = strongly agree. This scale is one of the most common tools in social science and marketing research, due to its ability to accurately and balanced measure attitudes and opinions, and its ability to provide a gradual range that allows the respondent to express the degree of agreement or disagreement with each statement. This reduces bias in responses and increases the reliability of the data. The five-point Likert scale is also suitable for converting qualitative data into quantitative data amenable to statistical analysis, allowing the researcher to analyze the relationships between different variables and draw accurate conclusions.

Each variable in the study was adapted from scales used in previous studies to ensure validity and reliability. For example, the green training variable was adapted from Yafi and Haider [41] to measure the possibility of green training contributing to enhancing environmental knowledge. Green innovation was adapted from Khan& Malik [42] to assess Shifting towards environmentally friendly innovations in company operations. Using a five-point Likert scale contributes to the collection of accurate and reliable quantitative data, enabling the researcher to analyze the relationships between variables and test hypotheses in a scientifically rigorous manner. It also enhances the replicability and validity of the results in the context of green marketing and environmentally friendly product research.

3.2. Population and Sample

Data were collected from the state Company for Food Industries in Iraq. Therefore, the participants in this study were employees with job ranks in this sector. The research hypothesis was tested by collecting data using a quantitative methodology, with a recruitment strategy for collecting data via an online survey. To ensure participants from various oil companies across Iraq, the online survey was posted in social media groups for employees of the General Company for Food Industries. A total of 160 valid responses were obtained, as shown in Table1.

Table1: Respondents characteristics

Respondents	Frequency	Percentage (100)
Gender		
Male	112	70.00
Female	48	30.00
Educational		
Diploma	50	31.25
Bachelor's	80	50.00
Postgraduate	30	18.75
Age		
25- 30 Years	40	25.00
31- 40 Years	38	23.75
41- 50 Years	45	28.13
51 $\geq$ Years	37	23.13
Job position		
Manager	35	21.88
Vice President	3	1.88
section head	40	25.00
Employee	82	51.25
Experience		
5 $\leq$ Years	20	12.50
5-10 Years	29	18.13
11-15 Years	28	17.50
16-20 Years	38	23.75
20 $\geq$ Years	45	28.13

3.3. Data Analysis Method

To assess the model in the current study, the partial least squares structural equation modeling (PLS-SEM) technique was utilized. This technique is widely employed not only in business and management studies, but also in almost all other social science disciplines. The current investigation used Smart PLS 3 software. PLS-SEM has two levels of evaluation. The first stage involves assessing the measurement model, followed by assessing the structural model. The results section will go into detail about each step and its criteria.

4. Results and Discussion

4.1 Measurement Model Assessment

The PLS-SEM study begins with an evaluation of the validity and reliability of each concept. To do this, the internal consistency, reliability, convergent validity, and discriminant validity of each indicator were evaluated.

The results of the measurement model evaluation are shown in Table 2 shows the outside loadings for each indication. The composite reliability varied from 0.943 to 0.960, which above the 0.70 threshold [43]. The extracted average variance was used to assess convergent validity. AVE values vary from 0.640 to 0.724, which exceeds the suggested limit of 0.50. The measurement model analysis met the criteria for convergent validity. However, the loading for items GI 5 (0.671) and GI 7 (0.616) was less than 0.70.

Table 2: Validity And Reliability

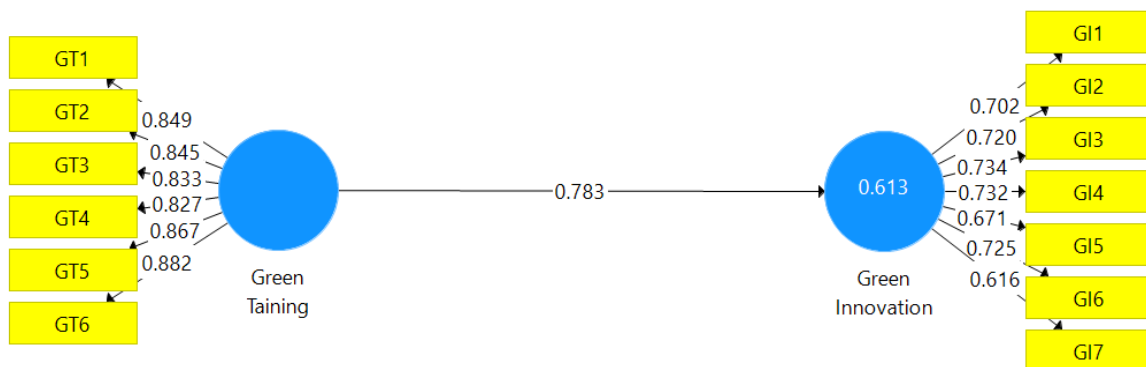
Construct	Indicator	Loading	C α	AVE	CR
Green training	GT 1	0.849	0.852	0.640	0.871
	GT 2	0.845			
	GT 3	0.833			
	GT 4	0.827			
	GT 5	0.867			
	GT 6	0.882			
Green innovation	GI 1	0.702	0.924	0.724	0.940
	GI 2	0.720			
	GI 3	0.734			
	GI 4	0.732			
	GI 5	0.671			
	GI 6	0.725			
	GI 7	0.616			

Table 3: Discriminant validity

Variable	Green Innovation	Green Training
Green Innovation		
Green Training	709	

The absolute value should be <0.85 (Henseler et al., 2015). As a result, the value of the HTMT has obtained discriminant validity, as shown in Table 3.

Figure 1: Measurement model



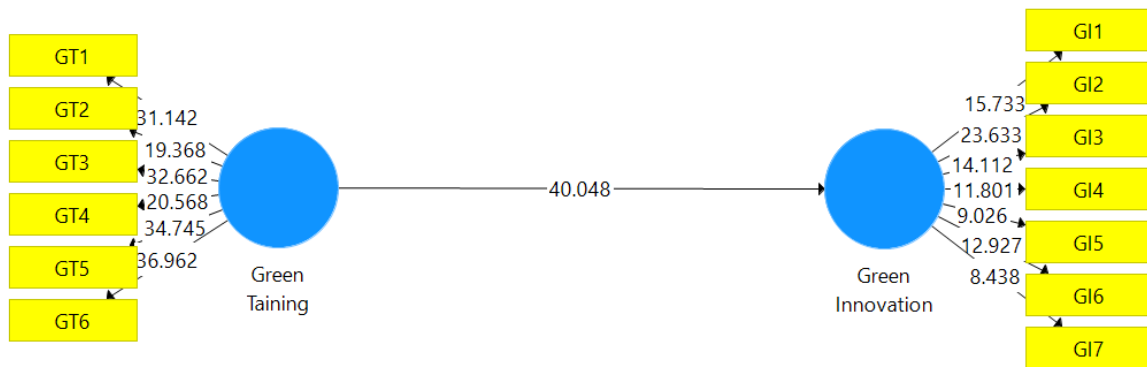
4.2. Structural model

Subsequently, the structural model was evaluated. The results are presented in Table 4 and Figure 2. The R^2 is 0.613, which means that the Green Training explained 61.3 % of the variance in Green Innovation; hence, this proportion should be of interest to company considering GT. Furthermore, the hypothesis was tested using bootstrapping with 500 resampling. This study empirical data reveals a positive and substantial link between GT and GI ($\beta = 0.783$, $t = 40.048$, $P = 0.000$).

Table 4: Hypothesis test result

Path	Standard (β)	SD	T- Value	P- Value	R2	Result
GT→IG	0.783	0.020	40.048	0.000	0.613	Confirmed

Figure 2: Structural model



4.3. Discussion

PLS-SEM results reveal a positive and substantial relationship between GT, the independent predictor variable, and GI, the dependent variable. A positive direct connection of GT on the GI construct is consistent with the hypothesized direction, hence H1 is validated. This indicates that training programs designed to spread environmental awareness and green skills among employees effectively contribute to the adoption of new ideas, technologies, and processes focused on sustainability, such as reducing waste, rationalizing energy consumption, designing eco-friendly packaging, and developing new products from renewable materials.

5. Conclusion And Implications

This study conclusively confirms the pivotal importance of green training as an effective strategy for driving green innovation within the food industry. The statistical results provide strong support for the main hypothesis, indicating that organizations' investment in developing their employees' environmental knowledge, skills, and capabilities goes beyond achieving compliance with legal standards. It also creates a stimulating environment for creativity and generating new Eco- friendly ideas, products, and processes. This reinforces the theory that human capital is the key component of any successful strategic transformation toward sustainability. This study contributes to the theoretical literature in the fields of green human resource management and sustainable innovation by providing empirical evidence from a vital and often overlooked sector. It also supports the conceptual model that directly links training practices to innovation outcomes at the organizational level, opening the door for future research exploring other mediating variables such as green organizational culture or the role of leadership. The study delivers a clear message to decision makers and business managers in the food industry: implementing systematic green training programs is a profitable investment, not a cost. It reduces operating costs in the long term through rationalization of consumption, opens up new markets for environmentally conscious customers, improves the organization's image, and gives it a strong competitive advantage.

Finally, it is recommended that food industry establishments adopt comprehensive green training policies, promote a culture of internal innovation, and periodically measure and evaluate the return on this investment. The study also suggests conducting future research on other industrial sectors or examining the impact of specific types of training on a specific form of green innovation.

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