

# Sparking Creativity and Innovation and Its Impact on Employees' Productivity (Field study on the Ministry of Electricity and Oil of the Kurdistan Region of Iraq)

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## Abstract

This paper aims to assess the influence of creativity and innovation on improving employees' productivity. Innovation and creativity shape organizational image and profile generate new job opportunities, reduce costs, and hence, contribute to improving employees' productivity. However, due to high-risk rates of innovation, creativity failure, extreme change, and complex circumstances especially from a commercial point of view within the market, countless challenges are being imposed on organizations. The latter should face them efficiently. This situation entails organizations to leverage their innovative and creative abilities to find newfangled solutions and ideas. This study reflects the relationship and influence of creativity and innovation as independent variables and employees' productivity as a dependent variable. The quantitative research grounded on a questionnaire has been addressed to 366 employees as a sample drawn in simple random technique from Iraqi Kurdistan Region's Electricity and Natural Resources ministries as a field of study. Answers were grouped and analyzed using first the descriptive analysis and second by calculating the linear regression to support and validate the research hypotheses. In a conclusion, the Ministries of Electricity and Natural Resources have interest in creativity and innovation. Accordingly, efforts should be fostered to reach advanced and satisfying levels of creativity to improve employees' productivity.

**Keywords:** Creativity, Innovation, Employees' Productivity.

## 1. Introduction

The development and improvement of organizations lead to paving the way for employees to apply their educational and practical experiences and experiments in creativity. Innovation and creativity are of paramount necessity to employees' development facilitating the creation of new applicable ideas that can contribute to solving problems and create a new competitive environment. The latter enables them to enter new markets and appeal the biggest number of customers (Potočnik *et al.*, 2021). Innovation and creativity build a high profile for an organization, increases the economic and development shares of an organization, creates new job opportunities to reduce unemployment,

reduce expenses costs, and contribute to meeting demands quickly and generating higher employee productivity (Audretsch & Baletski, 2021). Creativity is integrated into an organizational culture to establish welfare, development, and social responsibility for stakeholders (Visser & Kruyen, 2021). Creativity is a new idea, method, or means. Innovation in information technology, algorithms, and software leads organizations to adopt new ideas, devices, or methods to achieve better results with less work (Tajudeen *et al.*, 2021). Can an organization create without innovating or innovate without creating? Can organizations innovative without being creative, or be creative without being innovative? Creativity and innovation are two close concepts,

sometimes confused and yet very different. Creativity is about having ideas, not necessarily about implementing them (Kahn, 2018, p 457). This is a phase of reflection, imagination, and mental brainstorming. Managers develop scenarios, and plans, and consider costs and feasibility, but always without going beyond the concept stage. Creativity can make it possible to remedy a problem, a fault, or a lack. Creativity can identify them, dissect them and resolve them. A mixture of curiosity and audacity generating ideas without censorship. However, these ideas will remain at the abstract stage, unless they move on to the innovation phase. Ideally, innovation does not go without creativity, and vice versa. It is better to have a bunch of ideas to get a tangible result, and a good idea does not go far without effective implementation resulting in gains (Lam et al., 2021, p8-10).

### 1.1. Research Problem

The prevalent change and modernity in all environments including the Iraqi Kurdistan Region's Ministries of Electricity and Natural Resources occupy a wide range of contemporary organizations' awareness and thought. Creativity and innovation provide these organizations with an effective course of action that enables them to fulfill goals accurately. Improving productivity is one of the most important methods that makes an institution attain the highest levels of efficiency of services through the development, employment, and adoption of employee's skills and capabilities for being an added value and a driving force (Hameed, Nisar, and Wu, 2021, p92).

The increased risk of failure as a deficiency in innovation and creativity is assessed as a crucial obstacle to decrease employees' productivity. It is noted that the circumstances that have become surrounding contemporary organizations are characterized by extreme change and complexity. These great challenges were not witnessed before, therefore organizations should confront them swiftly. Organizations and public ministries are required to have creative abilities to discover innovative resolutions to solve operational problems (YuSheng and Ibrahim, 2020, p8-9), and it comes to the fore in these circumstances. Innovation and creativity are astonishing revolutions altering technology and enhancing

employees' productivity. In this context, a group of factors transformed creativity and innovation into important facets.

### 1.2. Research Objectives

This research aims to present theoretical and empirical aspects with practical recommendations to enhance creativity and innovation, and improve employees' productivity.

The objective behind this research is to :

1. Offer a diagnosis of the influence of creativity and innovation on employees' productivity.
2. Govern the influence of the association linking creativity and innovation with employees' productivity.

### 1.3. Research Questions

Based on the above mentioned, the study problems can be specified in the following questions:

1. To which extent do the ministries of Electricity and Natural Resources provide and consider creativity and innovation?
2. What is the relation between creativity and innovation with employees' productivity in the ministries in question?
3. How can creativity and innovation improve productivity in the ministries of Electricity and Natural Resources in Kurdistan?

### 1.4. Research Significance and Structure

Innovation and creativity are critical in managing modern organizations. This paper highlighted the association relating to those variables and helped in building a simple conceptual framework and hypotheses. For the practical significance, the empirical study is beneficial since it emphasized the relationship and role of the two independent variables (innovation and creativity) in improving employees' productivity in public ministries. It contributed to distinguishing the importance of those two variables in modern organizations.

This paper is structured in five main axes. The first axis describes the research problem, the research objectives, and the research significance. The theoretical context, the second axis, presents relevant scientific documentation on the subject. The framework of the research method, the third

axis, contains elements of the research methods that were used to carry out the research. The fourth axis presents the results grouping together quantitative analysis. The results discussion is presented concerning the organizational problem and the initial theoretical context. This last part of the paper highlights the main conclusions that emerge from the study and has made it possible to progress in raising new topics and research questions.

## 2. Literature Review

Theories about creativity and its components date back more than a century. Guilford has been the first to make a research breakthrough in this regard. Creativity refers to divergent thinking directed towards finding new ways to solve problems in exchange for convergent thinking and correct answers that push employees and organizations to achieve better results (Gholami and Karimi, 2014, 73).

Organizations search for new markets with the aim of growth, geographical expansion, diversification, and integration being the obvious factors in their life cycle. Creativity, however, is an essential factor for an organization to survive, keep up with worldwide rapid developments, and achieve economic growth (Hughes et al., 2018, 560). Creativity becomes valuable when serving individuals, groups, facilities, industries, or communities. Creativity is a meaningful valuable innovation. Creativity becomes valuable when (Khalili, 2018, p325):

1. Make sure that ideas are innovative or just new ideas, as the latter is not enough.
2. Being able to reach and catch up with creativity, ideas should be considered more than merely being innovative to possess valuable ideas.
3. Teaching organizations and individuals alike how to transform innovation into creativity.

To be new and useful, creativity goes through main stages (Sarooghi, Libaers, and Burkemper, 2015, p12):

a- **Motivation stage:** it involves recognizing a specific problem based on gains, accumulations,

and experiences that form a starting point for a person's new ideas.

b- **Immersion stage:** it involves a good awareness of the problem without thinking of its solution.

c- **Unloading stage:** it occurs when unconsciously thinking of a problem through shifting thinking into other things at unspecific moments like waking up from sleep and engaging in daily activity.

d- **Inspiration stage:** it involves finding suddenly and unexpectedly a solution that flashes in the mind.

e- **Investigation stage:** it involves testing the validity and quality of innovation. It might require some modifications and changes in the creative product to improve and display it in the best way (Khalili, 2018, p328).

### 2.1. Innovation Overview

Innovation is outlined as a procedure that includes the introduction of a new product, new ideas, or services to the market. It requires that the new product be different from the existing product or at least that the consumer perceives it as a different product. Innovation has been delineated as being the application of new ideas that lead to a marked improvement in products, services, organization, and marketing. Innovation has been demarcated as the method of generating, developing, and executing a new product, procedure, and service, to cultivate efficiency and competitive advantage. Innovation adds value to the organization and stakeholders. Aiming to statistically and statically validate a positive influence and relationship between employees' productivity and the performance of the organization (Khalili, 2016, p 2278-2290). The (OECD), Organization for Economic Cooperation and Development, defines innovation in organizations as the set of scientific, technological, organizational, financial, and commercial methods that enable an organization to introduce new and improved products to the market (Cheng et al., 2019, p 12). Innovation can be distinctly demarcated in administrative terms as the ability to exploit future perceptions. Innovation explores opportunities to assess consumers' values, wants, and expectations and try to meet them. Therefore, innovation is an imperative measure in determining organizational

excellence and prosperity. Innovation produces incomes and/or gives existing resources enhanced wealth-creating proficiencies (Botega and da Silva, 2020, p 1107).

Innovation is both an initiative and a behavior. First, as a behavior, it represents a set of procedures that activate creative performance by motivating employees to work in a creative and unfamiliar technique. Second, an initiative represented by is a tendency to excel, and an innate willingness shown by the individual's ability to exceed the normal context of thinking and follow a new pattern of thinking. Innovation is the process of collecting original, innovative, and valuable ideas to solve problems. It includes the construction, adoption, and execution of new ideas for procedures, products, and services (Brem and Puente-Díaz, 2020, p 12-14).

### 2.1.1. Innovation Perspectives

Innovation is the process through which novel ideas, things, practices, technologies, or processes

are generated, reinvented, developed, adopted, disseminated, and used. Regardless of its source, internally or externally, results in the generation of an additional value for the entity. In an assessment of the market point of view, innovation is the introduction of new and useful ideas and their rapid transfer to the market, and their implementation to produce tailor-made services/products to meet the needs of the target market (Rajapathirana and Hui, 2018, p 45-50). Besides, the characteristics of innovation are addressed in three facets. The first is a development of an existing thing where the innovation is in the form, size, or contents of the good or service. Second, an idea for a successful decision that solves a specific problem such as the decision to cost the commodity while maintaining its quality. Third, re-arranging, combining, or coordinating the dispersed elements and ideas to create something useful (Tagues et al., 2021, p17). Various reviews of management literature have shown that the concept of innovation can be defined according to four perspectives.

**Table 1: Innovation Perspectives (Ponta, Puliga and Manzini, 2021; Pichlak and Szromek, 2021; Edwards-Schachter, 2018)**

Perspectives	Description
Employees' perspectives as individuals	The basis of innovation is constructed on individual and collective skills in terms of developing products and processes.
Customer's perspective	Innovation is due to the impact of new products to satisfy their wants or need.
Organization Perspective	An emphasis on technical sources and origins is represented by the introduction of a new product allowing to gain market shares, and the implementation of original work methods to gain productivity.
Economic perspective	Innovation is a peculiarity distinguishing economic penetration and modernization concerning technological progress and production functions.

### 2.1.2. Innovation Orientations

The view of innovation has changed a lot nowadays, it has been converted into a stipulation of the modern era. Innovation is stipulated as a dominant feature in advancing and developing both economic and social facets. Innovation is the focal indicator inferring in the progress of organizations (Valdez-Juárez and Castillo-

Vergara, 2021, p7-9). Many reasons upsurge the significance and status of innovation as it advances, progresses, and oversees personal skills in collective thinking. Innovation improves the quality of products, helps to generate and enhance competitiveness, helps to activate and increase the volume of sales, and finally contributes to generating and strengthening brand equity. On the other hand, innovation depended on individuals

applying their faith, desire, and mastery in practicing a field of knowledge (Saunila, 2020,p266). As mentioned by Frishammar et al.

(2019), orientation conditioning innovations are identified as:

**Table 2: Orientations of Innovation (Haefner et al., 2021; Woronkiewicz, 2021)**

Orientations	Importance
Action-Oriented	Innovators are always active, looking for original ideas, prospects, and innovative scenarios.
Simplicity Oriented	Innovators focus on simplifying product development methods. End-users tend to understand easily simple innovation.
Customer-Centric	Product-oriented: when innovators are interested in customers' needs.
Size Oriented	Innovators allow growth in a precise method and at an accurate time.
Goal-Oriented	Creators of innovation strive to conquer accomplishments by searching for the most suitable niche market.
Try/Test Oriented	Innovators should always abide by internal regulations of trying /testing and swotting innovative ideas.
Risk Oriented	Innovation can be assessed as a guarantee of achievement and success. Most importantly, failure is a leverage tool for innovation.
Time-Oriented	Every innovator must follow a timeline indicating the achievement of the product or service ; it is vital to hold an effective agenda for project planning and evaluation.

Modern organizations take advantage of its benefits to survive the swiftly fluctuating business environment. From this point of view, recent publications by Taques, Botega, and da Silva, advised that creativity and innovation is an essential factors in the long-term survival and organizational success (Taques et al., 2021), Innovation has the characteristics of

differentiation, novelty, discovery, proactiveness (Botega and da Silva, 2020; Brem and Puente-Díaz, 2020).

**2.1.3. Stages of Innovation**

Innovative ideas are created through seven stages:

**Table 3: Stages of Innovation (Chen, Yin, and Mei, 2018; Dziallas and Blind, 2019)**

Stages	Explanation
Customers need analysis	Organizations seek to satisfy their customers; therefore, they use technology in their activity to meet the needs and desires of customers.
Generation of ideas	New ideas are elaborated allowing advancement and accepting new initiatives unless it is definitively confirmed that these ideas are not suitable for the application.
Initial ideas sifting	At this stage, a wide range of ideas are available. Ideas that are not appropriate with the capabilities of the organization are excluded.
Ideas Evaluation	In this stage, innovative ideas are evaluated in detail, and the viability of ideas is judged in light of several criteria that determine the usefulness of the ideas and their economic feasibility.
Ideas Testing	It represents the testing phase and ensures the applicability and marketability of the product being developed.

Application	The actual application of the innovation takes place on the ground and becomes a tangible by the customer.
Evaluation of the results	In this last stage, it allows its application and knowing the customers' reactions, where the results of this innovation are evaluated. Results may be positive, negative, or a mixture of the two.

## 2.2. Creativity Overview

Creativity is the engine of economic growth. From this perspective, creativity is defined as the substitution of the old ideas with innovative concepts or presenting old ideas in a better way. Innovative ideas are presented in light of increased interest in time and accelerated growing desires, needs, ambitions, and aspirations. Accordingly, there has been a necessity to introduce something new that enhances competitive features responsible for improving productivity and revenues. Creativity is of paramount importance for the success and prosperity of organizations in the current work environment. The secret of creative organizations lies in their ability to reach the new, add a bigger value, and introduce a product that is better than competitors' products (Azamela et al., 2022, p4-7).

There are several definitions of creativity. Some argue that it is the process of generating real or imaginary ideas or items and employing them usefully and in new ways (Ali, 2019, p. 19). Others say that creativity is the main driver of motivating and guiding employees, introducing the feelings of curiosity and fear, establishing and cutting ties, and evaluating, which are the four basic elements of organizational creativity (Mumford and Todd, 2019, p30-70). Creativity plays a fundamental role in problem solving, adaptation, learning, and coexistence. However, it differs from their practices (Wang et al., 2019, p699-700). Creativity consists of rearranging what is known to reach the unknown. To think creatively, we must be able of rethinking what we consider normal (Hughes et al., 2018, p. 550).

### 2.2.1. Importance of Creativity

Creativity is one of the basic components of change. Technological advancement, growth of knowledge, competition intensification, globalization expansion, individual needs diversity, lack of resources, communications

effectiveness have forced organizations to be more responsive (Borowski, 2021). This cannot be realized through innovative ideas only. Organizations should work on finding a big number of creative people (Ek Styvén et al., 2022, p292). The role and importance of creativity lie in the following areas (Ali Al Qudah, 2018, p50-140):

1. Developing a person's capability to acquire new ideas and solutions.
2. Developing the spirit of mutual feelings, and creating methods and ways to solve their problems.
3. Creativity has become important to organizations for its role in reducing overall costs through producing smaller products, providing faster services or more accurate operations (Shafique, Ahmad, and Kalyar, 2020, p115-120), and meeting customer's needs through developing and producing new goods and services. Creators receive rewards in return for their creative ideas and for finding new markets (Kahn, 2018; Lam et al., 2021).

### 2.2.2. Characteristics and Factors of Creativity

Roblek et al. (2021); Khalili (2016, p. 31-32) recommended implementing suitable and efficient strategies to support, develop and sponsor creativity in all the fields at the organization. Creativity is an effort linked to perception, visions, and new formulas. This requires special abilities to observe, listen, and search. To be efficient, creative ideas should be addressed to meet the needs and desires and their result should be obvious and easy (Roblek et al., 2021). Khalili (2016, p. 31-32); Saunila (2020) has talked about the characteristics of creativity in general and briefed them on three: first of all, an individual and collective phenomenon, secondly, a general humanitarian phenomenon not limited to anyone, and thirdly, a personality phenomenon related to inherited factors and can be developed. Factors encouraging creativity are the changes in the work

environment that have imposed the necessity to find new methods and mechanisms as follows (Hourri & Khadrawi, 2010, p. 5-6).

### 2.3. Differences between Innovation and Creativity

Before presenting variances differentiating innovation and creativity in public ministries, it is critical to shedding light on their common

benefits. First of all, those terms are becoming progressively imperative factors in employees' productivity and strategic success. Public organizations are seeking to control employees' suggestions. The procedure of creating and implementing ideas is a prominent competitive advantage (Liu et al., 2017, p1167-1180). The difference between creativity and innovation is summarized in table (4).

**Table 4: Variances Differentiating Creativity and Innovation (Bleda, Querbes, and Healey, 2021; Sharma and Sharma, 2021)**

<b>Creativity</b>	<b>Innovation</b>
Founded on the capability to discover an unusual idea	Created on the capacity to implement ideas in an unfamiliar new way
Imagination is stipulated as a leverage tool for creativity	Innovation is postulated as an outcome of continuous production procedures
Creativity success rates do not possess a specific quantifiable measurement scale; therefore, this term is hard to assess	Innovation has measurable scales of its success rate. The latter are correlated as it relates to the invention and the birth of original ideas.
Creative progression does not require financial budgets and expenses	It is characterised in the execution and operation procedures, so, naturally, it requires financial costs
He is not afraid of taking risks	Potential for risk, such as failure to implement the creative idea
The creative process consists of flexibility, abundance, and originality	The ability to use the conscious and subconscious method to solve problems and persuade others

From the previous table, creativity is represented in the production of new and appropriate ideas. As for innovation, it implements novel ideas and then delivers both operational and organizational changes. Weiss, Hoegl, and Gibbert (2017) consider creativity as a synonym for innovation. Gholami and Karimi (2014) defined the relationship between them "every innovation begins with a creative idea for individuals or a group working together". creativity brings new things that did not exist before, while Innovation works on molding or shaping those things that become tangible, such as goods and services. Creativity is the process of arriving at an unusual solution to a particular problem, and innovation consists in its application, while innovation is concerned with the embodiment of these ideas and access to innovative ideas, it is called creativity,

but transforming these ideas into useful reality is called innovation (Boicu et al., 2016, p6).

### 2.4. Employees' Productivity

Productivity is a measure of human resources' efficiency and effectiveness. It is represented by the effort expended by the workforce in achieving the quantity of production and virtuous usage of resources available to reach the desired goals at specific times, in specific quantities, and required quality. Consequently, productivity is a quantifiable procedure of task performance, taking into account the cost of the resources used (Almaamari and Alaswad, 2021, p4-7). Productivity represents the results of the work of the forces participating in the production process, in addition to being a measure for measuring the outcome of using a certain amount of these forces

in the production process (Kang, Yu, and Lee, 2016, p1457).

High productivity refers to the ability to achieve the largest possible amount of output with the same number of resources. More than a few factors control productivity improvement, including equipment and technology used in production, raw materials, location, people, prevailing systems, work methods, and administrative methods (Indah et al., 2020, p29-

30). The identification of these factors is beneficial in recognizing priorities for change to refine productivity. Employees' productivity led to organizational success, economic growth, and amplified profitability. It has a very important impact on the organization's ability to achieve its goals because increasing productivity improves the investment of production elements by following many methods, including the following (Tunio et al., 2021, p10664).

**Table 5: Productivity Methods (Hafeez, Yusrini and Hussain, 2020| Kale, Ryan and Wang, 2019)**

Methods	Explanation
Increasing the output from the same inputs	This step is completed whether using advanced technology or by developing the skills of individuals through training and gaining experience.
Reducing the inputs to produce the same amount of output	Producing output by reducing inputs can be done by controlling, and directing workers' jobs. These managerial tasks are developed to reduce time and leverage efficiency.
Increasing outputs and decreasing inputs together	It is possible to use modern equipment to reduce the percentage of production damage (non-conformity with specifications).

Employees' productivity is a key determinant of economic growth (Adeinat and Kassim, 2019, p780-802).

## 2.5. Hypotheses Construction

Following results verified in the research of Khan and Mohiya,(2020) and Stojcic, Hashi, and Orlic, (2018) when managers are questioned about the significant productivity factors, innovation, creativity, and the control of financial procedures are those most widely cited. Efficient creativity and innovation endeavors abet to cultivate employees' productivity. Innovation and creativity are effective levers for companies facing challenges. These levers are related to four aspects, first, the mental and physical well-being of employees, second, the identity and image of the corporation, third, organizational digital transformation, and fourth, the financial performance. Integrating innovation and creativity into organizational culture and daily practices encourages employees to think outside the box, consequently improving employees' productivity. The analysis by (Mosadeghrad and Saadati, 2020,

p6205) reveals that this mindset boosts employees' productivity and competitiveness.

### 2.5.1. Relationship between Innovation and Employees' Productivity

The link between innovation and productivity has been studied in detail. Recent research in the field of innovation, especially the study of Brem and Puentes-Díaz (2020); Rajapathirana and Hui, (2018); Taques et al., (2021) has shown that there is a significantly imperative association between innovation and productivity. Applying a comprehensive scale of innovation that takes into account the production and technology adoption has a durable and positive relationship between innovation and productivity. However, other studies like the study of Haefner et al., (2021); Woronkovicz (2021); Chen, Yin, and Mei (2018); Dziallas and Blind (2019) support that time is a mediating variable, therefore, the required time for innovation affect positively and significantly employees' productivity and its influence varies across industries. A greater number of companies, and in particular public ministries, have access to innovation, improving their productivity and

competitiveness. Building up on previous literature, the first hypothesis is:

**Hypothesis One:**

- **Ho.1:** Innovation has no statistical influence on employees’ productivity.
- **Ha.1:** Innovation has a positive statistical influence on employees’ productivity.

**2.5.2. Relationship between Creativity and Employees’ Productivity**

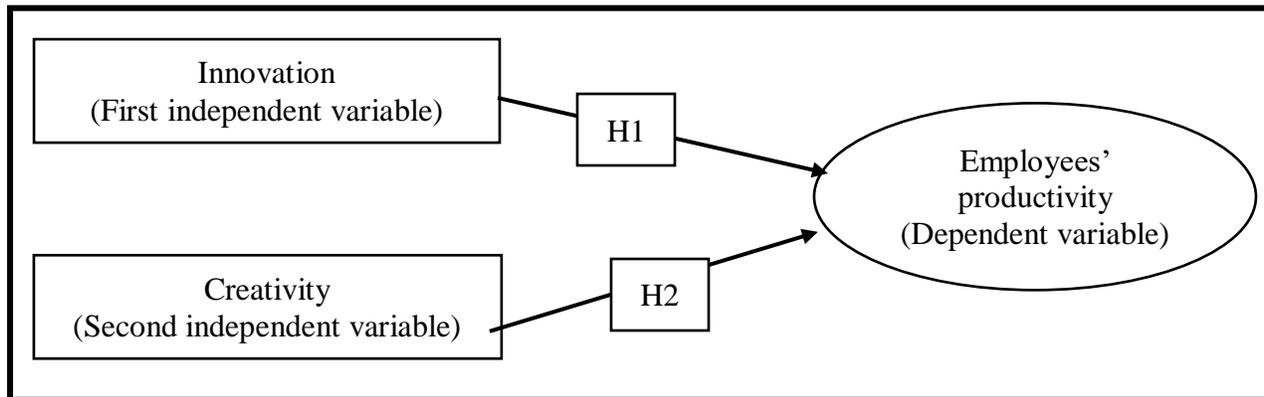
To remain competitive, companies need employees capable of planning, adapting, and proposing creative ideas and solutions. Therefore, organizations need to possess creative employees with effective interpersonal and technical skills to improve their productivity. Indeed, organizational creativity is a rich source of ideas to acquire

effective solutions to solve internal and external. Therefore, creativity is viewed as a foundation of higher productivity ((Hameed, Nisar, and Wu , 2021); YuSheng and Ibrahim (2020); Distanont and Khongmalai (2020)). Accordingly, these verified facts help to construct the second hypothesis.

**Hypothesis Two:**

- **Ho.2:** Creativity has no statistical influence on employees’ productivity.
- **Ha.2:** Creativity has a positive statistical influence on employees’ productivity.

**2.5.3. Conceptual Framework**



**Figure 1:** Research Conceptual Framework

**3. Research Methodology**

To answer the raised problem and test hypotheses, the analytical and descriptive approach is adopted. It studies, accurately describes, and analyzes quantitatively employees’ productivity phenomenon through fostering creativity and innovation. It is suitable to report facts and understand the topic since the role of general concepts in improving productivity is covered. The analytical approach is used to analyze and diagnose some issues related to the ministries of Electricity and Natural Resources in the Kurdistan Region. The descriptive statistical approach is used for the practical side. Then a questionnaire was adopted to collect information and data about the extent of creativity and innovation and their influence on improving employees’ productivity.

**3.1. Survey Sampling**

The target population includes 8000 bachelor-degree-holding employees from class one to class seven in the ministries of Electricity and Natural Resources in the Kurdistan Region of Iraq. A random sample will be drawn according to the Sample Size Calculator in large communities:

$$n = \frac{z^2 p(1 - p)}{d^2}$$

n= minimum sample size

Z= Standard normal distribution= 1.96

P= Estimated proportion from previous and similar studies= 0.50

D= Tolerated margin of error= 0.05

Since the community size is determined to be less than 10000, the sample size should be as follows:

$$nsz = \frac{sz}{1 + \frac{sz}{N}}$$

### 3.2. Quantitative Method

This research paper aims to exhibit a verified relationship between creativity and innovation as independent variables on employees' productivity as the dependent variable in the Iraqi Kurdistan Region's Electricity and Natural Resources ministries. It illustrates the relationship between the study variables by analyzing a sample of 366 employees. Both variables have been studied to generate two hypotheses. To test the validity of these hypotheses, the study has mainly adopted a questionnaire to collect data. A set of statistics including linear regression to study the

significance of the previously deduced hypotheses.

### 4. Data Analysis

The current topic aims to diagnose the reality of employee productivity when it's influenced by creativity, and innovation among workers in the Ministry of Electricity and Natural Resources, through 366 valid questionnaires. The questionnaire's statements representing the dimensions of chosen variables (employees' productivity, creativity, innovation) are discussed in this section, as well as the statistical indexes. The Likert scale founded on the five points is interpreted first in the table below. However, it is effective at this stage to start with the validity and reliability of the questionnaire.

**Table 6: Interpretation of Likert Scales Measures**

Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1-1.80	1.80-2.60	2.60-3.40	3.40-4.20	4.20-5
Very weak	weak	Moderate	High	very high

#### 4.1. Validity Analysis (KMO)

The established KMO threshold of 0.90 specifies an exceptional modification of items to the factors; 0.80 to 0.90, a good fit; 0.70 to 0.80, a medium fit; from 0.60 to 0.70 a poor fit, and for values less than 0.60 the fit is unsatisfactory and inadequate. Therefore, the factor analysis should

not be assumed unless weak items at fault are removed. The results of the validity measures for the innovation, creativity, and employees' performance are offered respectively.

**Table 7: Validity Analysis (KMO)**

Index	Innovation	Creativity	Employees' Productivity
KMO	0.846	0.929	0.833
Bartlett test	1217.322	2104.421	2039.303
degree of freedom DF	21	21	28
P-value	0.000	0.000	0.000
number of statements	7	7	8

#### 4.2. Reliability Analysis

In general, all three factors were found to be highly reliable and valid. These values of

reliability coefficient (alpha coefficient) show a high internal consistency among variables testing

the corresponding factor in the battery used. The reliability analysis is embodied in the table below.

**Table 8: Reliability Analysis**

Index	Innovation	Creativity	Employees' Productivity
<b>Cronbach Alpha</b>	0.866	0.934	0.911
<b>P-value</b>	0.000	0.000	0.000
<b>number of statements</b>	7	7	8

The analysis presents Cronbach-alpha coefficients ranging from 0.866 to 0.934 which exceeds the accepted threshold of 0.5. Employees' productivity as a dependent variable was measured in total (8) items directed to measure its reliability. This variable obtained a coefficient of stability ( $\alpha = 0.911$ ). Creativity was measured in total (7) items. Creativity attained a coefficient of stability ( $\alpha = 0.866$ ). Innovation was measured in total (7) items and gained a coefficient ( $\alpha = 0.934$ ), and thus the axis of the variable items forming these variables are highly valid and gives the same

results even if the questionnaire is redistributed to the same sample after some time

#### **4.3. Descriptive Analysis of Variables' Arrangement**

The Ministry's practice of innovation and creativity is considered a good condition and an acceptable practice. The dispersion of the sample's opinions led to a significant availability of innovation, creativity, and employees' productivity in a mean that is equivalent to the Ministry's aspiration.

**Table 9: Descriptive Analysis of Variables and Their Dimensions**

Variables	mean	standard deviation	Relative importance	Coefficient of variation	Number of statements
<b>Creativity</b>	3.84	0.953	24.81	76.6	7
<b>Innovation</b>	3.67	1.053	28.69	73.4	7
<b>Employee Productivity</b>	3.67	1.106	30.13	73.4	8
<b>General Average of Variables</b>	<b>3.70</b>				

Innovation with a relative coefficient of difference (28.69%), and was provided with a mean (3.67) high level, while the second dependent variable explained employees' productivity arrangement and a relative difference coefficient (30.13), and provided a mean (3.67) high level.

#### **4.4. Presentation, and Analysis of the Independent Variable (Innovation)**

As the overall innovation attained a high-level mean of (3.67), which indicates to the ministry the ministry's adoption of innovation and its transformation into unconventional work patterns make a competitive advantage. As for the innovation statements relative coefficient of variation is the following:

**Table 10: Presentation and Analysis of Innovation**

Statements	Mean	Standard Deviation	Relative Importance	Coefficient Of Variation
1. The Ministry provides a suitable environment for innovation	3.76	1.128	75.2	30
2. The Ministry is working to develop innovation skills among employees	3.74	1.169	74.8	31.25
3. The Ministry is interested in circulating new and distinguished ideas that contribute to simplifying work	3.77	1.133	75.4	30.05
4. Management welcomes unconventional ideas to overcome business problems	3.84	1.012	76.8	26.35
5. Workers can offer several alternatives to deal with work problems	3.64	1.152	72.8	31.64
6. Changes are made in work methods from time to time	3.56	1.129	71.2	31.71
7. Change is a natural phenomenon that must be adapted to	3.40	1.283	68	37.73
<b>Innovation</b>	<b>3.67</b>	<b>1.053</b>	<b>73.4</b>	<b>28.69</b>

The innovation diagnosis of the 7 statements in the research questionnaire attained a mean of (3.84-3.40) at a high level, a standard deviation (1.283-1.012), and a variation coefficient of (37.73%-26.35%), and a relative interest (76.8%-68%). Public ministries as a field of study are welcoming innovative non-traditional ideas to overcome work problems by providing an appropriate environment for innovation. To circulate new and distinct ideas and turn them into work mechanisms that contribute to simplifying work procedures and developing innovation skills among its members, especially since they can offer alternatives to deal with various problems and work conditions, which prompted them to make changes in work methods

from time to time. Innovation is considered in this field and contributed to improving employees' productivity.

#### **4.5. Presentation, Analysis of The Independent Variable Creativity**

As shown by the results of Table (11), creativity was measured through (7) statements. Creativity got a higher mean of (3.84), which indicates that the ministry adopt creativity and creative ideas. Creativity reached a standard deviation (.953), a relative interest (76.6%) is good, and a coefficient of variation (24.81%) indicates consistency. The relative coefficient of variation, are:

**Table 11: Presentation and Analysis of Creativity**

Statements	Mean	Standard Deviation	Relative Importance	Coefficient Of Variation
1. The Ministry provides a suitable environment for creativity	3.69	1.226	73.8	33.22

2. When hiring, the Ministry takes into account the recruitment of workers capable of achieving the advantage of creativity	3.83	1.043	76.6	27.23
3. Management encourages the introduction of new ideas	3.86	0.918	77.2	23.78
4. The Ministry encourages creativity in the work environment to keep pace with scientific and knowledge developments	3.87	1.012	77.4	26.14
5. The Ministry is working to develop the creative skills of employees	3.90	1.096	78	28.10
6. The administration is keen to prepare courses and activities aimed at developing creative capabilities	3.81	1.125	76.2	29.52
7. The administration supports new ideas that contribute to improving the conditions of workers	3.93	1.055	78.6	26.84
<b>Creativity</b>	<b>3.84</b>	<b>0.953</b>	<b>76.6</b>	<b>24.81</b>

Statements appearing in the research questionnaire obtained a mean (3.93-3.69) at a high level, and a standard deviation (1.226-0.918) indicates dispersion in the level of answers and the lack of agreement to some extent, with a relative coefficient of variation (33.22%-23.78%), and a good relative interest (78.6%-73.8%). These facts verified that the ministry tends to encourage its members to present new ideas, as it was keen to encourage them to present various creative ideas in the work environment. To keep pace with scientific and knowledge developments, as well as to support new ideas that contribute to improving the conditions of workers, by taking into account attracting individuals who can achieve the advantage of creativity when hiring, programs have been allocated for them to develop their creative skills, and to provide courses and activities aimed at enhancing their creative

abilities, and to provide an environment suitable for And the spirit of creativity that you aspire to achieve.

#### 4.6. Examining and Diagnosis of the Dependent Variable (Employees' Productivity)

Employees' productivity was evaluated with (8) statements from the perspective of (366) employees in the Iraqi Ministry of Electricity and Natural Resources. Employees' productivity in total got an efficient mean of (3.67), which indicates that the ministry provides quantitative outputs. The overall variable got a standard deviation (1.106), a moral comparative interest (73.4%), and a coefficient of variation (30.13%) signifying consistency. For the statements forming employee's productivity, relative coefficients of variation, are presented:

**Table 12:** Presentation and analysis of employee productivity

Statements	Mean	Standard Deviation	Relative Importance	Coefficient Of Variation
1. Employees have the desire to work outside working hours if necessary	3.55	1.218	71	34.30
2. Employees organize their work and time	3.86	0.950	77.2	24.61

3. Your department achieves its goals in less time than expected	3.67	1.299	73.4	35.39
4. Your department achieves its goals with fewer employees needed	3.63	1.257	72.6	34.62
5. Your department achieves its goals with less than expected financial costs	4.03	0.932	80.6	23.12
6. Employees are committed to getting their work done in less time than expected	3.50	1.336	70	38.17
7. Employees strive to complete the required amount of work	3.53	1.332	70.6	37.73
8. Employees cooperate in the event of additional burdens	3.57	1.289	71.4	36.10
<b>Employees' Productivity</b>	<b>3.67</b>	<b>1.106</b>	<b>73.4</b>	<b>30.13</b>

These statements obtained a mean (4.03-3.50) at a high level, and a standard deviation (1.336-0.932) with a relative coefficient of difference (38.17%-23.12%), and a relative interest of (80.6%-70%).

#### 4.7. Hypotheses Testing

##### 4.7.1. Testing the Influence of Innovation on Employee Productivity

The first hypothesis was identified in two forms, null and alternative hypotheses. A linear regression model was implemented as follows:

**Table 13: The Influence of Innovation on Employee Productivity**

Independent Variable	Employees' Productivity						
	$\alpha$	$\beta$	R <sup>2</sup>	A R <sup>2</sup>	Sig	T	F
Innovation	0.573 (0.000)	0.879	0.772	0.771	0.000	35.094	1231.556

The calculated value of (F) for the model (1231.556) at the significance level (0.000), higher than the accepted threshold of (3.841) at the significance level (0.05) to indicate the significance of the model, in addition to the existence of an interpretation coefficient (0.772). At the significance level (0.000), and with a corrected interpretation coefficient (0.771), innovation was able to explain (77.2%) of the changes that occur in employees' productivity. A strong positive effect of innovation (0.879) at the significance level (0.000), and with an estimated (T) value (35.094), as the Ministry of Electricity and Natural Resources was able to employ innovation in improving employees' productivity.

From all the results presented, the first alternative hypothesis is accepted (*Innovation has a positive statistical influence on employees' productivity*). Accordingly, the following equation is written:

$$\text{Employee Productivity (Y)} = (0.573) + 0.879 * (\text{Innovation})$$

##### 4.7.2. Testing the Effect of Creativity on Employee Productivity

The second hypothesis was constructed and acknowledged from the literature review. The implemented linear regression model shows the following results:

**Table 14:** The Effect of Creativity on Employees' Productivity

Independent Variable	Employees' Productivity						
	$\alpha$	$\beta$	R <sup>2</sup>	A R <sup>2</sup>	Sig	T	F
Creativity	0.418 (0.000)	0.916	0.839	0.838	0.000	43.539	1895.613

The calculated value of (F) for the model (1895,613) at the significance level (0.000), represents the significance of the model, in addition to the existence of an interpretation coefficient (0.839). At the significance level (0.000), and with a corrected interpretation coefficient (0.838), creativity was able to explain (83.9%) of the changes that occur in the productivity of workers. It was found that there is a strong positive effect of creativity (0.916) at the significance level (0.000), and with a calculated (T) value (43.539). Employing creativity in improving employees' productivity is significant. Consequently, the presented results verified the second alternative hypothesis (*Creativity has a positive statistical influence on employees' productivity*). Accordingly, the following equation is obtained:

$$\text{Employee Productivity (Y)} = (0.418) + 0.916 * (\text{Creativity})$$

#### 4.8. Results Interpretations

The empirical study based on quantitative research with a questionnaire confirmed that innovation and creativity have a positive statistical influence on improving employees' productivity. Adopting innovation and creativity in the functions of public ministries denotes that the latter is not restricted nor confined within traditional organizational frameworks. It is also concentrating on innovative and creative ideas to strengthening and reinforcing employees' productivity. From all of the above, innovation and creativity are assessed as the organizational procedure for solving a problem, and their application leads to a significant positive influence on employees' productivity. This study is an extension of the study of Saunila, (2020); Frishammar et al. (2019). It supports that both innovation and creativity and their relationship and influence on employee productivity are highly significant and positive. Empirical results are related to those supported by the study of Stojcic, Hashi, and Orlic (2018); Mosadeghrad and Saadati (2020), and (Mohamed et al., 2018).

**Table 15:** Main Hypotheses Outcome

Main Hypotheses	Outcome
<b>Innovation And Employees' Productivity</b>	Ho.1: innovation has no statistical influence on employees' productivity. <b>Rejected</b>
	Ha.1: innovation has a positive statistical influence on employees' productivity <b>Accepted</b>
<b>Creativity And Employees' Productivity</b>	Ho.2: creativity has no statistical influence on employees' productivity. <b>Rejected</b>
	Ha.2: creativity has a positive statistical influence on employees' productivity. <b>Accepted</b>

#### 5. Conclusion And Recommendations

Today, productivity remains a guiding principle of managerial thought, a priority within organizations, and, for many, a personal practice.

At the aggregate level, increasing total factor productivity is the major source of long-term growth and competitiveness. Public ministries are under considerable pressure to leverage

innovation and creativity in their workforce to adapt quickly to both changing market conditions and disruptive technologies. Knowledge, innovative, and creative employees must be flexible, and good strategists to take advantage of this new economic reality. Innovation requires both having a global and creative vision to identify new opportunities and being able to implement them concretely. Innovation and creativity have become fundamental pillars of modern work culture, both as qualities expected of employees and socially recognized key factors for success.

Electricity and Natural Resources ministries have shown interest in their employee productivity by urging them to tolerate high innovation and creativity and to think outside the box to achieve their tasks. This subject has pushed employees to manage work and time in line with the slogan and led to the achievement of work efficiently and effectively. Finally, these ministries have adopted innovation and worked on its improvement through streamlining work processes.

The following recommendations can improve the influence of innovation and creativity on employees' productivity in public ministries by implementing the following mechanisms:

- Urging employees to achieve within the set time without wasting time and effort.
- Prioritizing tasks according to needs.
- Fostering the spirit of cooperation, sacrifice, and integration among employees and overcoming the ministries' interests over personal quarrels.
- Offering rewards that suit the objectives set by the ministries.
- Creating an atmosphere that promotes innovation and supporting it with material and in-kind rewards
- Conducting sessions and activities to develop creativity in employees.
- Adopting change is a proper phenomenon that drives ministries to adapt to the external environment.
- Introducing innovation aspects and restructuring services provision methods and patterns.
- Authorizing employees to submit constructive suggestions and adopting them as alternatives to improve employees' productivity.

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