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An analysis of relationship between innovation management capability and sustainable development pillars: empirical study on an Algerian port company

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Abstract:

This research sought to determine the strength and nature of relationship between innovation capability and the application of sustainable development pillars. A questionnaire was designed and handed or sent to the employees of Djen Djen Port international .It was established that a moderate almost strong positive correlation existed between innovation management capability and the implementation of sustainable development pillars in the port company.

Key words: innovation management; sustainable development; capability; pillars, Port Company.

JEL Classification Codes: O32, Q50.

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Introduction :

Major developments in different economic, scientific, and technological fields have changed the way businesses function in the modern age. This is why, in order to maintain its growth and economic sustainability, the firm must innovate. Only when innovation is adequately managed throughout the application process is it deemed a significant asset to businesses.

Thus, the management of innovation involves too many skills and ideas that are fundamentally different from conventional management tools and skills, which is why the management techniques and tips concentrate on ensuring sustainable development (Tidd and Bessant, 2018)

Accordingly, The research seeks to determine the role and the impact between innovation management and the dimensions of sustainable development through application in the Algerian port company of the international DJEN DJEN port in Jijel,Algeria

The importance of this research is:

- To present a theoretical and applied framework that clarifies the relationship and the impact of innovation management and the dimensions of sustainable development, as this link in it may represent a modest addition for sustainable innovation.
- Interestingly, then it could be a new addition to the Algerian ports in the field of management.
- To provide the correct practical bases that enables the research sample company to determine the innovation management capability.

The guiding research question is: **"What is the nature and type of correlation and effect between innovation management and the pillars of sustainable development in the company researched? ".**

Based on this guiding question, it is hoped that this study will answer the following questions:

•What is innovation management and sustainable development? And what are their main pillars?

•What is the relation and effect of innovation management on sustainable development?

Research hypotheses: The methodological treatment of the research problem requires defining one main hypothesis, which is as follows:

H: There is a significant and positive correlation between innovation management and the dimensions of sustainable development in the researched company.

The researcher relied on the descriptive analytical method in testing hypotheses. The research, as the relevant data were collected for a sample of the functional cadres in the researched company through the distribution of questionnaire form for the job cadres.

The remainder of the paper is organised around this summary. The first section discusses related literature about managing innovation for applying sustainable growth pillars, while the second section discusses methods. The findings are then described in the next section; moreover, the fourth section includes a discussion of the key findings; we present theoretical and practical consequences, and we conclude in the last section.

2. A brief literature review

As previously said, sustainable development should be founded on three pillars: environmental, economic, and social sustainability. However, although firms seek a competitive edge via innovation, they must also consider environmental and social factors, resulting in three pillars of sustainable innovation.

The consequences of sustainable innovation on firm performance have been one of the primary research dimensions as sustainable innovation has become an active area of innovation. While the effect of sustainable innovation on firm performance has been investigated, the effect of sustainability as a motivation for innovation remains unclear (Shin et al., 2018).

Aside from attitude studies, much research has been done on actual patterns of domestic energy use and efficiency, innovations in energy technologies, human factors in and responses to pollution and environmental degradation, and the politics of environment and energy, as well as some other resources such as land, water, and minerals. Environmental parties and, in certain cases, their connections with states have been researched by sociologists (Burns, 2016).

Sustainability is about accomplishing more with less, which most individuals and organizations throughout the world would agree is a good concept since it allows you to earn more now and in the future. Destruction of the Earth and consumption of all resources appears to be a worse intelligent method over time; now, producing with fewer resources appears to be economically advantageous if done correctly. In both internal and external innovations, new solutions are evaluated, verified, and marketed. "Reduce, reuse, and recycle" are the foundations of sustainability and the circular economy, and all of this may be accomplished incrementally or dramatically. However,

by doing so in a bold way, we may achieve both a significant transformation and a favourable market position (Penker et al.,2018).

Innovation is critical for companies and institutions to embrace changes possibilities and ease the adoption of sustainable development. In many domains, unfortunately, moving sustainable innovation from an original concept or lab scale to production or commercial capacity is difficult (Ranjbari et al., 2021).

It will be critical to establish strong innovation infrastructures at both the firm and country levels in order to achieve sustainable financial success and growth. Nonetheless, innovation leadership will need to be driven from the top down by senior management to guarantee that it receives the attention it deserves throughout the firm (Maxwell, 2010). Furthermore, the essential dynamics driving the industrial alliance innovation ecosystem's long-term institutional expansion should be investigated from both within and outside viewpoints (Oliveira-Duarte et al., 2021;Huang et al., 2020).

Nevertheless, the pursuit for sustainability is already transforming the competitive environment, forcing businesses to reconsider their product, technology, process, and business model strategies. Innovation is the key to development, especially in times of economic distress. Early movers will create capabilities that rivals will find difficult to match if they regard sustainability as a goal today. Because sustainability will always be an integral part of progress, they will benefit from that competitive advantage (Ram et al., 2014).

Sindhu et al. (2021) in their study, they have made an attempt to identify the factors for entrepreneurs to embrace sustainable practices. According to their suggested model, the variable 'public investment in encouraging sustainable business' can strategically affect the linking factors and the dependent variable 'entrepreneurial mind-set.' As a result, it has been noted that public money, when combined with other moderating variables, might influence an entrepreneur's attitude toward the application of sustainable business activities.

In one study, the researchers looked at the numerous opportunities and constraints involved with entrepreneurship in the Fourth Industrial Revolution in developing countries to see if they were ready. Their article suggests that entrepreneurs should reconsider and introduce the strategic planning that will make them significant in the future, via business model innovation, while also advocating that more should be done to address the causes of policy and institutional breakdowns (Oyebanjo & Tengeh, 2021).

In one study, the researchers have presented sustainable development as a crucial element in the context of innovation. While it is still true that sustainable development is a critical factor in producing value, service and product uniqueness will play a bigger

role in defining a firm's market opportunities in the future. Sustainability-driven innovation is primarily responsible for this gap (Luqmani et al.,2017). The performance of a firm is determined by a number of aspects, one of which is environmental sustainability. Environmental factors that contribute to the economy include government policies, infrastructure, regulations, customers, market access, industry associations, and corporations (Chillakuri et al., 2020).

According to the "green economy", numerous innovative efforts have recently been committed to the challenge of using and looking for alternative energy sources to lessen the impact of human activities on Earth. Indeed, seeking sustainable development is becoming increasingly a worldwide concern (Serio et al., 2020).

It is uncertain which is more essential in the workplace since the relationship between innovation management and sustainable development has yet to be explored and comprehended.

Zhang et al. (2020) in their study, they have made an attempt to Green innovation in businesses has distinct qualities that are a focused representation of the enterprise's green innovation strategy. Firms in various industries with various characteristics may refer to the relevant green ideas to apply green innovation methods, save time, resources, and capital, and increase the efficiency of green innovation, if these qualities are comprehended and summarised (Zhang et al., 2020).

It is uncertain which is more essential in the workplace since the relationship between innovation management and sustainable development has yet to be explored and comprehended .Previous research has shown a theoretical foundation for sustainable innovation. To help overcome these gaps empirically, we investigate the relationship between innovation management competence and sustainable development pillars.

3. METHODOLOGY

After we presented in the previous two parts the various theoretical concepts related to the study variables, projecting these concepts to reality.This part of the study deals with a description of the procedures .The study, in terms of the study method, the study population, determining its sample, the tool used For data collection, validity and reliability, and the statistical processing that was used.

It was based on the distribution of a set of questionnaires to the various human resources of the Algerian port company of Djen Djen, Jijel, Algeria. The Port of Djen Djen is among the largest port works in the Mediterranean and considers itself to be the closest port to Hassi Messaoud (900km) and the oil areas.

This community was chosen because it is the most aware of the importance of managing innovation and sustainable development. The number of items in the sample was estimated at 30 items distributed but only 26 were answered.

In light of the study problem and its hypothesis, they were collected the data needed by the questionnaire, which is the most appropriate way to collect information for this purpose the purpose. The questionnaire consisted of two axes: The first axis: included personal information of the study sample, represented by gender, Age, degree, job title and years of service or experience. The second axis the impact of innovation management application on sustainability pillars in the company. Thus; a 5 point Likert scale was used, ranging from 'strongly disagree to 'strongly agree', to gather the interviewees' sentiment towards each proposition.These forms were processed using 26 v.spss program. Many statistical methods for data processing were relied on:

- Frequency distributions in order to analyze the characteristics of the study sample;
- Arithmetic means and standard deviations to identify the trends of individuals sample and dispersion;
- Alpha s' Chronbach's coefficient to measure the degree of questionnaire;
- Pearson test
- correlation coefficient;
- simple and multiple linear regression equation; ;
- ANOVA test

4. RESULTS AND DISCUSSION

In order to analyze the study sample and test the validity of the hypothesis using 26.V.SPSS program, using the solution of several statistical methods, through which we were able to present the following results:

3. **1. Analysis of the characteristics of the study sample: The following is the** analysis of demographic characteristics for the study sample, the results showed the following:

Table1. Characteristics of responds

		Frequency	percent
Gender	Male	16	61.5
	Female	10	38.5
	Total	26	100.0
Age	Between 30 and 40 years old	15	57.7
	Between 40 and 50 years old	10	38.5
	Between 50 and 60 years old	1	3.8
	Total	26	100.0
Experience	Between 5 and 10 years	9	34.6
	Between 10 and 15 years	10	38.5
	15 years and over	7	26.9
	Total	26	100.0
Job title	head of department	5	19.2
	head of service	5	19.2
	Administrator	13	50.0
	Other	3	11.5
	Total	26	100.0
Department	Direction	4	15.4
	Humaines ressources	6	23.1
	Finances	3	11.5
	IT	1	3.8
	Other	12	46.2
	Total	26	100.0

Source: SPSS results

Given that the organisation is a port, Table 1 demonstrates that the male gender makes up 61.5% of those participating in the execution of innovation management towards sustainability initiatives.

According to Table 1, the majority (57.7%) of the study participants are between the ages of 30 and 40, followed by those between the ages of 40 and 50.Young adults make up the majority of the senior managers and decision-makers in these two categories that apply innovation management.

The majority of survey participants (38.5%) have experience for a period Between 10 and 15 years. This demonstrates that they are sufficiently informed on the innovation management capability of the company and its relation with sustainable development.

The majority (50%) of research respondents are administrators, according to the findings. This shows that the majority of the respondents were able to read the questions, comprehend them, and then offer thoughtful comments. (46.2%) of the respondents to the research belong to the others department such as captaincy, domains and maintenance. This indicates that the study affected almost all the departments of the port and also they are concerned about management and innovation and sustainable development by using these two concepts in their work.

4.2 Testing the reliability and validity test: Cronbach's alpha test was used to measure the extent of Stability of the study tool.

Table2: measuring the stability and validity of the variables

Reliability Statistics	
Cronbach's Alpha	**N of Items**
.871	**14**

Source: SPSS results

The value of Cronbach's alpha coefficient is high, because it is higher than the accepted value 0.6 Referring to the validity coefficient of the study tool, it shows that the scale measures what it was designed to measure It is calculated by calculating the square root of the stability coefficient, which is known as the test validity. The test is true It is noticeable that the credibility of the test is very high, which indicates that a good measure to study.

The respondents were asked to give their opinion on questions regarding the relation between innovation management and sustainable development basing on their three pillars; social, economic and ecological pillar.

Table3. Analysing the relationship between innovation management and sustainable development according to questionnaire.

	Statement	SD	D	N	A	SA	mean	Std. Dev.
1	The company has opted for a management process adequate innovation with the components of the sustainable development	1 3.8%	0	4 15,4%	19 73.1%	02 7.7%	3.81	0.749
2	The company values the knowledge management and skills management in the innovation process	1 3.8%	5 19.2 %	8 30.8%	11 42.3%	1 3.8%	3.23	0.951
3	Innovation depends on factors vulnerable to changing environmental conditions and social (climate change, scarcity of water, environmental destruction)	1 3.8%	0	10 38.5%	14 53.8%	1 3.8%	3.54	0.761
4	The innovation process promotes the reduction risks (particularly in terms of health, safety and	1 3.8%	0	2 7.7%	21 80.8%	2 7.7%	3.88	0.711

	the environment, for employees and for neighboring communities).							
5	**the approach followed promotes access to goods and services of the highest possible quality according to the ISO9001 quality management system**	1 3.8 %	0	3 11.5 %	17 65.4%	5 19.2 %	3.96	0.824
6	**The company always seeks profitability in a prospect of financial viability**	1 3.8 %	0	2 7.7%	15 57.7%	8 30.8 %	4.12	0.864
7	**the company's strategy allows a fair redistribution of increased wealth, advantages and amenities for the greatest number**	1 3.8 %	1 3.8 %	12 46.2 %	11 42.3%	1 3.8%	3.42	0.809
8	**Likely factors are very important at the heart of the process and can represent dangers for the person (crime, accidents, working conditions, work, living environment, mobility, food, etc.)**	1 3.8 %	1 3.8 %	9 34.6 %	15 57.7%	0	3.46	0.761
9	**Innovation is a crucial aspect for the organization with the aim of investing in modern technologies**	2 7.7 %	0	5 19.2 %	15 57.7%	4 15,4 %	3.73	1.002
10	**Innovation increases systematically with occupational health and safety management.**	1 3.8 %	2 7.7 %	2 7.7%	19 73.1%	2 7.7%	3.73	0.874
11	**The company aims to implement a strategy of sustainable innovation to reduce bureaucracy and improve internal communication.**	1 3.8 %	0	6 23.1 %	16 61.5%	3 11.5 %	3.77	0.815
12	**Consistency between the defined innovation process by management to express the orientations and intentions of sustainable development is satisfactory**	1 3.8 %	1 3.8 %	12 46.2 %	12 46.2%	0	3.35	0.745
13	**Your company has carried out research projects and External Experimental Development (R&D) in the purpose of making profits.**	1 3.8 %	9 34.6 %	7 26.9 %	8 30.8%	1 3.8%	2.96	0.99
14	**Over the past three years, your business has introduces novelties concerning your methods of logistics, supply or distribution of raw materials, goods or services**	1 3.8 %	4 15.4 %	6 23.1 %	13 50%	2 7.7%	3.42	0.987
Composite Mean **3.59**							**Std. Dev.** **0.84**	

Source: SPSS results

Table 3 shows that data collected from the respondents with regard to statements assessing innovation management capability to go for sustainability.

The majority of respondents agreed with the statement though their responses were varied as shown by a high standard deviation value. Hence, the Company is interested with the components of the sustainable development.

The port company values the knowledge management and skills management in the innovation process, this shows that the respondents were in agreement with the given statement. It is therefore concluded that the company gives a great importance to skills management in the innovation process.

This can be inferred to imply that environmental conditions and social (climate change, scarcity of water, environmental destruction) are in the heart of innovation process.

Hence the port company values the ecological pillar of sustainability in their process of work. It determines the approach for assessing quality management and innovation management capability.this shows that the respondents agreed with the statement. the company always seeks profitability in a prospect of financial viability. So it indicates that the respondents agreed that profitability in a prospect of financial viability.

The company's strategy allows a fair redistribution of increased wealth, advantages and amenities for the greatest number.this shows that respondents were in agreement with the item showing that the port company respect the environmental pillar of sustainability. The company is being interested to dangers for the person (crime, accidents, working conditions, work, living environment, mobility, food…

The respondents agreed with the statement. Hence, it shows that organisation aims to investigate in modern technologies.

Hence, it can be concluded that the process innovation aims for occupational health and safety management. The company aims to implement a strategy of sustainable innovation to reduce bureaucracy and improve internal communication. This indicates that the respondents were in agreement with the item.

The respondents agreed that there is a strong relation between the defined innovation process by management to express the orientations and intentions of sustainable development in the port company. The results mean that the company's strategy aims to introduce new methods of logistics, supply or distribution of raw materials, goods or services.

In order to identify the nature of the relationship between innovation management and sustainable development, this part is devoted to verifying the extent to which the hypothetical scheme of the study is in force as follows:

4.3.1 Correlation measurement between innovation management capability and the application of sustainable development pillars:

Hypothesis: 'There is a linear relationship between innovation management and sustainable development.

If this hypothesis is correct, we put the following hypotheses:

H0: There is no linear relationship between innovation management and sustainable development pillars.

H1: There is a linear relationship between innovation management and sustainable development pillars.

To determine the degree and direction of the correlation between innovation management competence and the implementation of sustainable development aspects, correlational analysis using the Pearson method was conducted.

The results are shown in Table 4.

Table 4. Pearson correlation coefficient

Correlations			
		innovation	sustainbility
Innovation	Pearson Correlation	1	.699**
	Sig. (2-tailed)		.000
	N	26	26
sustainbility	Pearson Correlation	.699**	1
	Sig. (2-tailed)	.000	
	N	26	26
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: SPSS results

Table 4 gives a Pearson correlation coefficient of 0. 699, with a p-value of 0.000 < 0.05. This shows that the correlation coefficient is statistically significant. Thus, we reject the null hypothesis H0 and accept the existence hypothesis H1.The coefficient shows the existence of a positive association between innovation management capability and the application of sustainable development pillars, which is statistically significant. Therefore, there is a moderate relation almost strong of innovation management which has a positive influence on sustainability. This finding argued that applying the dimensions of sustainable development play an important role in the innovation process for the company.

4.3. Regression Analysis of innovation management capability on the Implementation of sustainable development pillars

The research sought and generated regression equation on measuring innovation management capability in applying sustainable development pillars. This led to a regression model whose coefficients are discussed in the subsequent sub-themes.

4.3.1 Model Summary of Regression of innovation management capability and Implementation of sustainability pillars

The model summary sought to determine how innovation management capability as predictor significantly or insignificantly predicted implementation of sustainable development pillars. The regression model summary is presented in Table 5.

Table5. Model summary of innovation management capability and implementation of sustainability dimensions.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.699[a]	.489	.468	.36989	.489	22.981	1	24	.000

a. Predictors: (Constant), innovation

Source: SPSS results

Table 5 of the model summary shows that there was a moderate positive correlation (R=0.699) between innovation management capability and the implementation of sustainable development pillars with those predicted by the regression model. In addition, 48.9% of the variation in the implementation of sustainability pillars was explained by innovation management capability while the remaining 51.1% is explained by other variables not in the model.

4.3.2 ANOVA of Regression of innovation management capability and the Implementation of sustainable development pillars.

The study aimed at establishing if the regression model was best match for predicting implementation of sustainable development pillars after employing a high level of innovation capability. The results of the regression coefficient are presented in Table 6.

Table 6. ANOVA of regression of value category and implementation of building construction projects

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.144	1	3.144	22.981	.000[b]
	Residual	3.284	24	.137		
	Total	6.428	25			

a. Dependent Variable: sustainability

b. Predictors: (Constant), innovation capability

Source: SPSS results

The ANOVA results on Table 6point out that F-statistic 1.24 = 22.981 is significant at p – value 0.000 < 0.05 indicating that the predictor coefficient was at least not equal to zero. Hence, there is a significant relationship between innovation management capability and the application of sustainability pillars.

4.3.3 Regression Coefficient of innovation capability and implementation of sustainable development dimensions

The study sought to establish whether there was an impact of innovation management capability on the implementation of sustainable development pillars. The regression coefficient results are presented in Table 10.

Table7. Regression analysis of innovation capability and implementation of sustainable development dimensions.

Coefficients[a]									
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	1.583	.410		3.857	.001			
	innovation	.498	.104	.699	4.794	.000	.699	.699	.699
a. Dependent Variable: sustainability									

Source: SPSS results

The regression results in Table 7 give the terms (β_0=1.583, p<0.05) and innovation management capability (β_1=0.498, p<0.05). Which are all statistically significant. This leads to establishment of a regression equation of implementation of sustainable development pillars on the innovation process given by:

Y=1.583+0.498X

Showing that for each unit increase in the innovation management capability, implementation of sustainable development pillars is marginally transformed by 0.495 units. It was therefore, concluded that innovation management capability and the implementation of sustainable development pillars are positively and linearly related.

The study focused on highlighting the relationship between innovation and sustainable development, and that the reforms, initiatives and efforts approved by the government to promote green economic diversification did not produce the desired results. Training, research and innovation are still lagging behind due to the short supply of them. Algeria has a huge and very important potential of the green economy port-export sector can contribute to creating opportunities for sustainable development and a better standard of living are still unknown.

However, in their study, Zhang et al. (2020) discovered that green innovation in enterprises has specific characteristics that are a focused depiction of the enterprise's green innovation strategy.

Secondly, according to the study, collaboration among different managers takes advantage of the benefits of both innovation and sustainable development. Thus, it is, certainly, one of the pillars around which managing innovation is built.

Conclusion

The purpose of the study was to determine the relationship that exists between innovation management capability s and the process of implementation of sustainable development pillars in DJEN DJEN international port. It was established that there exists a moderate positive correlation between innovation management capability and sustainable development pillars.

Recommendation: In light of the results obtained, we suggest the following:

- Some ports can present major risks in terms of because of the storage or handling of large quantities of hazardous substances, or because they are located near installations presenting this type of risk. He national legal requirements should then be observed and recommendations on prevention of major industrial accidents.
- The need to pay attention to the continuous innovation by Creating or renewing a culture of innovation with a shared vision, a world-class skill-set, and committed leadership in line with the technical development and the required skills, and the use of foreign expertise In this area.
- Develop training programs aimed primarily at encouraging employees in the institution under study to be keen to know the shortcomings or weaknesses in their work it encourages them to come up with new ideas for working methods.

Limitations and future research

Because senior managers are the only ones who can determine and take initiatives in innovation towards sustainability by proving the laws and guidelines within their organization, the researchers only sampled and focused on them. Additionally, despite being promised anonymity throughout the survey, some respondents may have felt that the sensitive nature of the material sought required them to withhold certain information and decline to respond.

There are several gaps in our understanding of sustainable innovation in research that come from our findings and would benefit from more study, including realist assessment, to extend and further evaluate the insights we generated here:

- A thorough examination of how innovation management is devoted to sustainable development and how to influence business processes in various firms would be quite beneficial.
- More methodological work on how to adequately capture the influence of various forms of innovation on each pillar of sustainable development in research is required, including further economic analysis.
- Conduct research to create ideas and conduct out activities related to implementing sustainable development pillars through ISO certification in order to make it more credible.

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