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Examining the Relationship between Knowledge Economy Dimensions and Technological Creativity: Evidence from an Industrial Firm in Algeria

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ABSTRACT

This study examines the relationship between the knowledge economy requirements and technological creativity within an industrial organization. The issue is addressed in light of the growing importance of knowledge-based resources in supporting technological development in emerging economies. The study adopted a quantitative descriptive design. Data were collected through a structured questionnaire distributed to a random sample of 50 employees at the Sanitary Ceramics Company in El Milia, Jijel. The data were analyzed using SPSS, with reliance on descriptive statistics and Pearson's correlation coefficient.
The results show a high availability of the knowledge economy requirements and a high level of technological creativity within the studied institution. They also indicate a strong, statistically significant positive relationship between knowledge economy requirements, taken as a combined set, and technological creativity. At the level of individual dimensions, human resource management and information technology have statistically significant positive relationships with technological creativity. By contrast, organizational performance and innovation do not show statistically significant relationships. The study suggests that managers should give priority to investment in human capital development and information technology. It also indicates the need for strategies that connect knowledge resources with technological creativity in a direct way, instead of relying only on traditional performance indicators.

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ცოდნის ეკონომიკის განზომილებებსა და ტექნოლოგიურ კრეატიულობას შორის ურთიერთობის შესწავლა: მტკიცებულება ალჟირის სამრეწველო ფირმიდან

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ცოდნის ეკონომიკა, ტექნოლოგიური კრეატიულობა, ინოვაცია, ადამიანური რესურსების მართვა, საინფორმაციო ტექნოლოგიები.

ეს კვლევა იკვლევს ცოდნის ეკონომიკის მოთხოვნებსა და ტექნოლოგიურ კრეატიულობას შორის ურთიერთკავშირს სამრეწველო ორგანიზაციაში. საკითხი განხილულია განვითარებად ეკონომიკებში ტექნოლოგიური განვითარების მხარდაჭერის თვალსაზრისით ცოდნაზე დაფუძნებული რესურსების მზარდი მნიშვნელობის გათვალისწინებით. კვლევაში გამოყენებული იქნა რაოდენობრივი აღწერითი დიზაინი. მონაცემები შეგროვდა სტრუქტურირებული კითხვარის მეშვეობით, რომელიც დაურიგდა 50 თანამშრომლისგან შემდგარ შემთხვევით ნიმუშს სანიტარული კერამიკის კომპანიაში, ელმილიაში, ჯიჯელში. მონაცემები გაანალიზდა SPSS-ის გამოყენებით, აღწერითი სტატისტიკისა და პირსონის კორელაციის კოეფიციენტის საფუძველზე. შედეგები აჩვენებს ცოდნის ეკონომიკის მოთხოვნების მაღალ ხელმისაწვდომობას და ტექნოლოგიური კრეატიულობის მაღალ დონეს შესწავლილ დაწესებულებაში. ისინი ასევე მიუთითებენ ძლიერ, სტატისტიკურად მნიშვნელოვან დადებით ურთიერთკავშირზე ცოდნის ეკონომიკის მოთხოვნებსა და ტექნოლოგიურ კრეატიულობას შორის, როგორც კომბინირებულ კომპლექტს. ინდივიდუალური განზომილებების დონეზე, ადამიანური რესურსების მართვას და ინფორმაციულ ტექნოლოგიებს აქვთ სტატისტიკურად მნიშვნელოვანი დადებითი ურთიერთობები ტექნოლოგიურ კრეატიულობასთან. ამის საპირისპიროდ, ორგანიზაციული მუშაობა და ინოვაცია არ ავლენს სტატისტიკურად მნიშვნელოვან ურთიერთკავშირებს. კვლევა ვარაუდობს, რომ მენეჯერებმა პრიორიტეტი უნდა მიანიჭონ ადამიანური კაპიტალის განვითარებასა და ინფორმაციულ ტექნოლოგიებში ინვესტიციებს. ის ასევე მიუთითებს სტრატეგიების საჭიროებაზე, რომლებიც ცოდნის რესურსებს პირდაპირ აკავშირებენ ტექნოლოგიურ კრეატიულობასთან, ტრადიციული შესრულების ინდიკატორებზე დაყრდნობის ნაცვლად.

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Introduction and review of literature

Since the transition to a knowledge-based economy in recent years, organizations had to create and maintain competitive advantages (Nasyiratudina et al., 2022). Knowledge, technology, and human capital have replaced traditional sources of production in order to improve business performance, especially in industries that face fast technological change and fierce competition (Akram et al., 2018; Turulja & Bajgoric, 2018). In this context, technological creativity is defined as the ability for companies to innovate or adopt new technologies to improve the efficiency, quality, and responsive to the demands of the market (Jin & Choi, 2019). Prior research has emphasized that technological creativity emerged through knowledge availability, human resources, and technological infrastructure (Omelyanenko & Omelianenko, 2023; Popa et al., 2022).

Even though many studies have been conducted on the knowledge economy and innovation, it is still uncertain whether business firms in developing countries meet the knowledge economy requirements to create

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technological creativity. Most of these studies have examined different aspects of the knowledge economy, such as human resources, innovation, or information technology, but not the knowledge economy as a whole. Also, much of this research has been conducted in developed countries, therefore it offers little insight into industries with structural constraints and high levels of competition, such as the North African manufacturing industry.

While Algerian industries are technologically dependent, they are also at risk of being overwhelmed by imported goods, and have limited ability to innovate. For instance, the sanitary ceramics industry is expected to compete with imported products for product quality, cost, and technological developments in order to stay viable. But little research has investigated whether Algerian firms can meet knowledge economy requirements to foster technological creativity. The current study examines the relation between knowledge economy requirements and technological creativity through a field study conducted at the Sanitary Ceramics Company in El Milia, Jijel. In testing this association empirically, the study contributes to research on knowledge-based management and technology creativity in emerging industries, and provides recommendations for managers who seek to boost their innovations despite competition.

Knowledge Economy: Concept, Importance, and Core Characteristics

Knowledge economy has attracted considerable attention as economies and organizations increasingly rely on intangible resources to generate value. Powell & Snellman, 2004 refer to knowledge economy as an economic mode whereby value is created by producing and delivering services based on knowledge, such as skills, expertise, and information (Powell & Snellman, 2004). This view places emphasis on the cognitive processes that drive innovation and scientific and technological progress while acknowledging the constant obsolescence of knowledge and skills. knowledge economy is also defined as a sub-discipline of economics that investigates the importance of knowledge in shaping economic growth and organizing economic activities; it is a post-capitalist stage in economic evolution (Foray, 2004).

Institutionally, the knowledge economy does not only involve the generation of knowledge but also its application across sectors. Grewal and Sheehan, 2005 highlight the interplay between research, development, innovation, and knowledge application within the economic activities (Grewal & Sheehan, 2005), as the Organization for Economic Co-operation and Development (OECD) describes it as one that is based on the production, dissemination, and use of knowledge and information (Hadad, 2017). This implies the role of those who possess, apply, and transfer knowledge as well as the interaction between human capital, technology, and organizational structures to enhance value both at the organizational level.

The United Nations Development Program (UNDP) elaborates further in its definition of the knowledge economy as one based on the production, dissemination, and use of knowledge in economic, social, and civil sectors with the ultimate purpose of improving the well-being of people (Uddin, 2023). Thus, knowledge economy is based on developing and sharing human capacity equally with others.

These perspectives show why knowledge differs from ordinary goods. It can be used by one actor without being exhausted. It may also gain value when it is shared, reused, or adapted by others (Hogan, 2011). For this reason, the knowledge economy can be understood as an economic system that depends on producing, applying, innovating, and disseminating knowledge in order to serve economic, social, political, and cultural objectives.

Importance of the Knowledge Economy for Institutions

On the corporate side, the importance of the knowledge economy comes from the fact that it relies on intellectual resources rather than physical or natural resources. Organizations are striving to incorporate the learning-based innovations into all aspects of their operations, from research and development to their own internal business operations and dealing with customers. This trend reflects an increase in the importance of intangible capital to economic output, organizational effectiveness, and profit (Powell & Snellman, 2004).

The knowledge economy also has the potential to improve institutional performance by helping firms to improve their productivity, reduce costs, and produce higher quality products and services using new techniques and innovations. Scientists and technologists working in a knowledge economy argue that scientific and

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technological progress in general contributes significantly to improved performance across sectors (Melnikas, 2018). More recently, studies have indicated that information management promotes innovation and efficiency in technology-based industries and clusters (Li et al., 2019).

The second role of the knowledge economy is economic renewal and competitiveness. Economies and organizations that have embraced the knowledge economy have experienced structural changes which have allowed them to continue to develop through innovation and their use of skilled and relevant human capital (Rezaeinejad et al., 2023). These transformations have meant fundamental changes in business practices, organizational standards, and institutional capabilities that have changed how firms operate and respond to global competition (Astarani et al., 2024).

Core Characteristics of the Knowledge Economy

The knowledge economy, in turn, displays a number of distinct characteristics that are affected by the rapid technological and cognitive advancements (Hadad, 2017). Knowledge is a factor of production above capital and labor. Information, expertise, and skills are direct sources of value, with ideas dominating over materials.

Second, the knowledge economy relies heavily on digital technology and information and communication technologies. Digital tools enable production, storage and distribution of knowledge as well as increased connectivity and flexibility in economic processes. Third, human capital and skills are vital to the knowledge economy as learning and skill-building are essential for innovation and competitiveness.

Further, innovation in the knowledge economy is based on open and networked collaboration: knowledge creation is no longer internal to organizations, but emerges from outside, through interaction with partners, customers, and research institutions. Knowledge is non-rivalry and scalable. Its value grows as it is shared and reused, not depleted, thereby encouraging continued economic growth and renewal.

Requirements of the Knowledge Economy in Institutions

Although knowledge is strategic, it is intangible and difficult to measure. The World Bank developed the Knowledge Assessment Methodology (KAM) and the Knowledge Economy Index to assess countries or institution's ability to produce, adopt and disseminate knowledge. There are four key requirements that need to be met for the institutions to be effective: organizational performance, innovation, human resource management, and information technology.

Organizational performance is the ability of an organization to reach its strategic goal quickly and effectively with the best use of its human, financial, and information resources (Conţu, 2020), as well as in non-financial dimensions such as operational efficiency, adaptability, and customer satisfaction (Gutterman, 2023).

Innovation is a process connected to creative ideas and the use of knowledge. Amabile, 1988 considers creativity as the basis on which innovation develops(Amabile, 1988). Seltzer and Bentley also address the importance of learning, transfer of knowledge, and defining problems (Hadad, 2017). Innovation does not occur on its own in the knowledge economy. It occurs in the combination of knowledge, technology, human resources, and a work environment that can foster new ideas.

Human resource management is an important component of this structure. HRM focuses on attracting, advancing, motivating, and keeping the human capital that contains most of the knowledge of the organization. Contemporary HRM practices focus more on learning, empowerment, and sharing of knowledge with the intent of increasing organizations' creative and innovative capabilities (Vaman et al., 2023).

Information technology also creates the technical base necessary to process, store, and distribute knowledge. IT systems can be used to make accessing information easier, ease communications and coordination, and support organizations to create and reuse knowledge. Accordingly, information technology thus serves as a major enabler in knowledge management and new ideas in knowledge-based institutions (Ansari et al., 2012).

Technological Innovation as an Organizational Outcome

Technological innovation is one of the most prominent expressions of creativity within an organization. According to Schumpeter's concept of innovation, a "necessary or useful change" in production methods (Godin,

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2008), technological innovation is the introduction of new or significantly improved products and processes. According to the OECD, technological innovation refers to product or process innovations which have been successfully introduced on the market or used in production (D'Oslo, 1994).

The following definitions emphasize the organizational dimension of technological innovation: One study define it as a set of technological innovations primarily associated with industry(Damanpour & Aravind, 2012), whereas another research describe it as the ability to enhance competitiveness and industrial leadership(Daham & Bellakhdar, 2021). All these views converge on the idea that technological innovation is the practice of new knowledge gained by way of research and development that can be applied in products, processes, and markets.

Technological innovation is also connected to organizational performance, productivity, and adaptability. Empirical studies show that digital and technological innovations can improve operational efficiency, customer experience, and product development (Quispe et al., 2024). They can also support organizational learning and some forms of cultural transformations within organizations (Dey, 2022). In this regard, technological innovation may be divided into product innovation and process innovation. Product innovation is concerned with developing or improving goods and services (Hanaysha et al., 2018) (Reguia, 2014). Process innovation focuses more on improving production and distribution methods, reducing costs, and increasing competitiveness (Tarik & Boukrif, 2015).

The Knowledge Economy Requirements and Technological Creativity

With the shift toward the knowledge economy, industrial enterprises have given more attention to innovation and technological creativity. These elements are now linked to growth, competitiveness, and the ability of firms to renew their activities. However, previous studies have scarcely examined the direct relationship between knowledge economy requirements as a whole and technological creativity as an organizational result. Most studies have focused on partial relationships, by studying one organizational or knowledge-related factor and its link with creativity or innovation.

Recent studies have revealed that conditions at work and knowledge-based companies can have a positive impact on creativity. Sarooghi et al., 2015 through a meta-analysis of previous research confirmed the relationship between creativity and innovation in low-tech businesses, highlighting the critical role of organizational conditions in technological creativity. (Sarooghi et al., 2015). Another study highlighted how human resources practices are beneficial for technological creativity in industrial firms, suggesting that the use of human capital promotes creative and knowledge-based activities (Al-Ghamdi & Abdel-Razek, 2015).

Several papers on related dimensions have appeared in other contexts, with Alnidawi and Jaffal, 2018 reporting that creativity enhances the performance of organizations, which is mediated by knowledge sharing, underscoring the role of knowledge capital in creativity (Alnidawi & Jaffal, 2018). A study in China reported that innovation helps organizations to perform better by enabling them to respond to changing market conditions, implying the indirect role of knowledge-based capacities(Zhu et al., 2022). In addition, a recent study argued that managerial and technological creativity is directly linked to institutional aspects of strategy, structure, and leadership, all of which are associated with the demands of the knowledge economy(Giotis & Papadionysiou, 2022).

Furthermore, recent evidence from emerging economies reinforce these findings. Al-Shammari et al. (2023) found that human resource management practices, including training and employee participation, improve technological creativity(Al-Shammari et al., 2023). Al-Faouri et al. (2024) also showed that the relation between technology application and smart human resource management has a positive effect on innovation performance, (Al-Faouri et al., 2024). These elements together form a kind of knowledge-based infrastructure that can support creative and innovative results.

The reviewed literature demonstrates that creativity and technological innovation are affected by organizational, human, and technological factors connected with the knowledge economy. Still, most previous studies treated these factors separately. They did not examine enough the relationship between knowledge

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economy requirements as a whole and technological creativity. This gap is clearer in industrial contexts in emerging economies, including Algeria. For this reason, the present study examines this relationship through a case study of the Sanitary Ceramics Company in El Milia, Jijel.

Research Problem and Hypotheses

The situation of industrial enterprises in Algeria is currently facing several pressures at once, such as fast technological change, global competition, and the move towards a knowledge-based economy (Ouchalal, 2024). To remain competitive, firms are required to tap into the knowledge resources, intellectual capital, and knowledge management systems. Innovation and development in technology are always at stake. This is certainly true in the industry of sanitary ceramics, where local producers compete with imported products and compete with the need to produce high quality, value for money, and innovation.

While knowledge-based organizational models are increasingly discussed, there is limited evidence from Algerian firms on how knowledge economy requirements mediated the creativity of technological ideas in those firms. An organization may have human capital, technological infrastructure, or innovation practices, but not always. It is essential to understand how these components interact individually and jointly with creative ideas, particularly at the firm level and in emerging industries.

The present study addresses this issue through the case of the Sanitary Ceramics Company (El Milia), Jijel, and examines the relationship between knowledge economy needs and technological creativity in this company. It analyzes organizational performance, innovation, human resource management, and information technology, and then examines their relationship with technological creativity. Based on this reasoning, the following hypotheses are proposed:

H1: Organizational performance is positively and significantly associated with technological creativity.
H2: Innovation is positively and significantly associated with technological creativity.
H3: Human resource management is positively and significantly associated with technological creativity.
H4: Information technology is positively and significantly associated with technological creativity.
H5: Knowledge economy requirements, as an integrated construct, are positively and significantly associated with technological creativity.

Methodology

Research Design

This study employs a quantitative, descriptive, and cross-sectional design to examine the relationship between knowledge economy requirements and technological creativity in an industrial organization. The design was used because the study aims to assess the relationship between variables through data collected from employees at one point in time.

Study Population and Sample

All employees of the Sanitary Ceramics Company in El Milia, Jijel, totaling 380 workers in 2026, form the study population. Insufficient access to the entire population made us conduct a random sampling procedure. A total of 75 questionnaires were sent out, of which 60 were selected for further analysis. After removing 10 questionnaires due to incomplete or unusable responses, we retained 50 valid questionnaires for analysis.

Table 01: Distribution of the Study Sample by Personal and Occupational Variables

Personal Data		Number	Percentage %
Gender	Male	36	72
	Female	14	28
Age	Under 30 years	7	14
	30 to less than 40 years	18	36
	40 to less than 50 years	21	42
	50 years and over	4	8
Job	Executive Staff	17	34

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	Control Agent	23	46
	Execution Agent	10	20
Educational Level	Baccalaureate or less	7	14
	Higher National Diploma	12	24
	Bachelor's Degree	11	22
	Master's Degree	8	16
	Engineering Degree	9	18
	Magister Degree	1	2
	PhD	2	4
Years of Service	Less than 5 years	6	12
	5 to less than 10 years	20	40
	10 to less than 15 years	15	30
	15 years and over	9	18

Source: *Prepared by the researchers based on SPSS output.*

The demographic and occupational characteristics of the respondents include gender, age, job position, educational level, and years of service. These characteristics are presented in Table 1. Male respondents comprised 72 % of the total sample, probably because their work in an industrial company was primarily male-oriented. Age groups 40-45 years and less were the most common group at 42 % and 30-40 years were the next most common. Control agents were the most popular job group, with 46 %, followed by executive staff (34%) who made up the largest group. The highest educational level was Higher National Diploma, with 24 % having a bachelor's degree and 22 % having a bachelor's degree. According to the years of service, most respondents had some experience in the company, with 70 % having more than five years of experience, suggesting some credibility in their answers as they may be quite familiar with the routines and work environment of the company.

Data Collection Instrument

The data were collected through a structured questionnaire based on prior research on knowledge economy requirements and technological creativity. The questionnaire had three main sections: demographic and occupational data; knowledge economy requirements; 16 items in four dimensions of organizational performance, innovation, human resource management, and information technology (each four items); and technological creativity (eight items).

Each response to the survey was scored on a 5-point Likert scale from 1: strongly disagree to 5: strongly agree.

Validity and Reliability

The validity of the questionnaire was tested through face validity and construct validity. Face validity was done by presenting the questionnaire to academic experts. Their remarks were taken into consideration before using the final form of the questionnaire. Construct validity was tested through Pearson's correlation coefficient between each item and its dimension. The results showed statistically significant correlations at Sig < 0.01. The correlation coefficients ranged between 0.504 and 0.819. This indicates that the items had acceptable internal consistency with their dimensions (Schober et al., 2018).

Reliability was tested by using Cronbach's alpha coefficient. As shown in Table 2, the values ranged from 0.613 to 0.843. These values are above the acceptable limit of 0.60 (Ragaa & Korichi, 2021). Therefore, the scales were considered reliable for the purposes of this study.

Table 02: Cronbach's Alpha Reliability Coefficient for the Study Variables

Study Variables	Number of Items	Cronbach's Alpha Coefficient
Organizational Performance	4	0.613
Innovation	4	0.686
Human Resource Management	4	0.786

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Information Technology	4	0.808
Knowledge Economy Requirements	16	0.843
Technological Innovation	8	0.820

Source: *Prepared by the researchers based on SPSS output.*

Data Analysis Techniques

The data were analyzed using SPSS. Means and standard deviations of the variables were used as descriptive statistics. Pearson's correlation coefficient was used to test the hypotheses and examine relationships between variables. Before hypothesis testing, normality of data distribution was assessed using skewness and kurtosis coefficients. All values were within acceptable ranges (skewness < 2; kurtosis < 7), indicating that the data were suitable for parametric statistical analysis (Ewan & Khairani, 2020).

Table 03: Skewness and Kurtosis Coefficients

Variables	Skewness Coefficient	Kurtosis Coefficient
Organizational Performance	0.756	1.541
Innovation	-0.290	-0.40
Human Resource Management	-0.265	-0.344
Information Technology	-0.505	0.520
Knowledge Economy Requirements	0.601	0.229
Technological Innovation	-0.437	1.782

Source: *Prepared by the researchers based on SPSS output*

Results

Descriptive Statistics

Table 04: Descriptive Results for Knowledge Economy Requirements

Knowledge Economy Requirements	Arithmetic Mean	Standard Deviation	Relative Importance	Agreement Level
Organizational Performance	3.850	0.307	1	High
Innovation	3.560	0.475	3	High
Human Resource Management	3.435	0.571	4	High
Information Technology	3.660	0.636	2	High
Knowledge Economy Requirements	3.675	0.336	/	High

Source: *Prepared by the researchers based on SPSS output.*

Table 4 displays descriptive statistics for the dimensions of the knowledge economy requirements. All dimensions had high mean values: organization performance was at the top of the table with a mean of 3.850 and standard deviation of 0.307, information technology was next (M = 3.660, SD = 0.636), followed by innovation (M = 3.560, SD = 0.475). Human resource management had the lowest mean among the dimensions, but it was still at the high agreement level (M = 3.435, SD = 0.571). The knowledge economy requirements variable had a mean value of 3.675 with a standard deviation of 0.336, indicating high availability.

Table 05: Descriptive Results for the Technological Innovation Variable

Dependent Variable	Arithmetic Mean	Standard Deviation	Agreement Level
Technological Innovation	3.872	0.459	High

Source: *Prepared by the researchers based on SPSS output.*

Table 5 displays the descriptive statistics of technological creativity. There is a high level of technological creativity with a mean of 3.872 and a standard deviation of 0.459.

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Correlation Analysis and Hypothesis Testing

Table 06: Results of Correlation Test for the Independent and Dependent Variables

Dependent Variable / Independent Variable	Technological Creativity			
	Correlation Coefficient	**Significance (sig.)**	**Relationship Strength**	**Decision**
Organizational Performance	0.264	0.064	Not Significant	Rejected
Innovation	0.244	0.087	Not Significant	Rejected
Human Resource Management	0.471	0.001	Moderate	Accepted
Information Technology	0.474	0.000	Moderate	Accepted
Knowledge Economy Requirements	0.524	0.000	Strong	Accepted

Source: *Prepared by the researchers based on SPSS output.*

Pearson's correlation coefficient was used to test the relationships between the independent variables and technological creativity. The results are depicted in table 6 and they were not uniform across the five hypotheses.

Organizational performance was not significantly related to technological creativity. The correlation coefficient was positive but weak and did not reach the required level of statistical significance ($r = 0.264$, $p > 0.05$). Innovation showed a similar pattern. Its relationship with technological creativity was also positive but not statistically significant ($r = 0.244$, $p > 0.05$). Based on these results, H1 and H2 were not supported.

The results were different for human resource management and information technology. Human resource management was positively and significantly associated with technological creativity ($r = 0.471$, $p < 0.01$). Information technology also showed a positive and significant relationship ($r = 0.474$, $p < 0.01$). Both relationships were moderate in strength. These findings support H3 and H4.

When knowledge economy requirements were treated as one integrated construct, the relationship became stronger. The correlation with technological creativity was positive and statistically significant ($r = 0.524$, $p < 0.01$). H5 was therefore supported. This suggests that the combined presence of knowledge economy requirements may matter more than some individual dimensions taken separately.

Discussion

The results of this study show that knowledge economy needs are very readily available at the El Milia Sanitary Ceramics Institution from the employees' perspective. It also signifies that the firm has started to adopt a strategy of incorporating knowledge as an essential resource and that managers are beginning to realize the value of technology, innovation, and human capital for developing the organization. While it is important to have knowledge economy requirements available, it is not sufficient unless these resources are used in a systematic way. As per the Knowledge-Based View of the firm, the ability of the firm can only be of the company when used to meet the demands of the market. The presence of a learning culture in the firm supports this view (Talari & Khoshroo, 2023). Although the results of this study highlight the gap between the availability of such resources and the creation of creative results, this gap between the possible resource and the creation of artistic outputs suggests the need for managers to intervene(Evans et al., 2016).

The results also show a high level of technological creativity in the studied institution. This indicates that the company has some capacity to transform available knowledge into technical solutions related to product development and process improvement. Alternatively, the possibility of a flexible system of organization that allows a certain amount of interaction between the units of work and promotes a share of knowledge might also be a contributing factor (Rajan et al., 2021). Overall, technological creativity does not come out of a separate action but resulted from implementing certain knowledge economy requirements in work itself, as was also the case with (Slavkovic & Babic, 2013), who argue that technological innovation requires embracing the knowledge of the organization.

In particular, the correlation between knowledge economy requirements and technological creativity was strikingly significant. This suggests that technological creativity can only be achieved through the combination

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of knowledge economy requirements and not individually. The focus of the company on human capital and information technology seems to be instrumental in its product quality and technical solutions. Accordingly, the knowledge economy should not be treated as a general theory but should be used as a practical strategy for technological creativity, efficiency, and productivity.

But this was not the case for technological creativity. This likely suggests that traditional measures of organization performance do not accurately reflect the creativity or innovative capacity of an organization. Productivity and efficiency may also be affected by administrative and routine factors which are not necessarily related to technological creativity. This diverges from the findings of Zhu et al. (2022), who note that the relationship between organizational performance and creativeness can be affected by context, sector, and measurement strategy (Zhu et al., 2022). Innovation as a dimension of the knowledge economy was also not significant with technological creativity. Although it is usually thought to be similar to creativity, this may illustrate a gap between the declaration of innovation and the actual practice of innovation. Adomako and Tran (2024) emphasize that it takes more than just the initiative to be successful innovation, but also strategic alignment, resources, and support (Adomako & Tran, 2024). In the studied organization, technological creativity may rely more on individual skills, technology transfer, and infrastructure availability than on innovation practices still not fully implemented in the organization.

Human resource management was positively associated with technological creativity. This finding is similar to those of other industrial and emerging market studies (Al-Ghamdi & Abdel-Razek, 2015) (Al-Shammari et al., 2023). This finding supports the idea that HRM can improve employees' creative ability by training, motivating, and inspiring the employees to turn their individual knowledge into collective results. Thus, HRM should be connected to the innovation system, rather than left as an administrative function (Chow & Gong, 2010); Xu et al. (2023) concludes that innovative behavior can be promoted by introducing systems of motivation and creativity to the workplace (Xu et al., 2023).

Finally, the results revealed that information technology positively correlated with technological creativity. This indicated that information technology systems supported access to knowledge, information sharing, and coordination between organizational units. Information technology is not only an operational tool at the studied institution, but also an asset to technological creativity and competitiveness (Al-Faouri et al., 2024) (Yang & Huang, 2016). Yet, information technology, as Smajlovi et al. (2019), notes, does not suffice alone. Its impact is dependent on its integration into organizational strategy and structure; if it is not integrated, technological innovation may be limited (Smajlović et al., 2019).

Conclusion

In a competitive and technology-driven business environment, being creative and innovative is increasingly essential for businesses to evolve and remain viable. So, the purpose of this study was to examine the relationships between knowledge economy needs and technological creativity through a field study conducted at the El Milia Sanitary Ceramics company. The results indicated that knowledge economy requirements were widely available in the firm. Technological creativity also recorded a high level.

The results also demonstrated a positive and statistically significant relationship between knowledge economy requirements as an integrated framework, and technological creativity. At the level of individual dimensions, the results were different. Human resource management and information technology had statistically significant relationships with technological creativity. Organizational performance and innovation did not show statistically significant relationships. This indicates that technological creativity in the company seems to be more related to human capital and information technology than to general performance indicators or innovation as a separate dimension.

The results of this study need to be viewed in light of the context in which they were obtained. The empirical analysis was conducted within one industrial organization, and thus the sample size was limited due to access constraints to this organization, which is common in field-based research in industries. But the study allowed for

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an in-depth understanding of the organizational context and insight into how knowledge economy requirements work in practice. Further research could extend the scope of this study to multiple organizations, to longitudinal studies or to include additional mediating and moderating factors to further explore the role of creativity in different industries and institutions.

Overall, the study suggests that industrial companies must revise their innovation strategies with a view to making use of human resources and information technology as major drivers of technological creativity. Through using integrated knowledge-based approaches, firms can more effectively use their intellectual assets for higher levels of technological and competitive advantage.

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