



Antecedents of Technological Innovation and Further Impact on Organizational Performance

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Abstract

Drawing on self-determination theory and social learning theory, this study aims to explore the antecedents of technological innovation and its impact on organizational performance. Using a cross-sectional online survey of 580 employees of Innovative Agribusiness sector companies in Spain and Italy. Results revealed several positive associations between antecedents of technological innovation and organizational performance. This study brings several key insights for use of technology in the innovative agriculture sector as well as many theoretical and practical implications along with future research directions.

Keywords

Innovative Agriculture, Technological Innovation, Organizational Performance, Creativity, Culture, Mindfulness, Competitive Pressure, Strategic Alignment, IT Readiness, Cognitive Readiness

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1. Introduction

Technological innovation is becoming more intense in the age of globalization, while rapid advancements that lead to shorter production have sped up. In this context, experts, corporate leaders, and authorities have highlighted the significance of innovation in achieving longer operational growth and firm performance. Nowadays, technological innovation can be found almost anywhere. The word “innovation” is being widely used by organizations “in their vision, mission, and objective statements” (Chen et al., 2018; Wang et al., 2017). The ability to innovate has been reported as a critical aspect in establishing organizational culture, IT readiness, strategic alignment, organizational mindfulness, and employee creativity all of which help in raising a firm's performance (Kahn, 2018).

Technological Innovation has been defined “as the successful implementation of creative ideas within an organization” (Ghosh, 2015). It has also been highlighted as “something new or improvement done by an enterprise to create significant added value either directly for the enterprise or directly for its customer” (Danso et al., 2020). Simply, technological innovation is the ability to put something new into practice as well as the realization of these value creations connecting creativity directly with technological innovations. Virtualization, wearable technology, customer research, business intelligence, sentient enhanced interactions, and Innovative Internet of things (IIoT) systems are among the innovations used by several companies. On the other hand, the corporations are concentrating on full digitalization and assimilation of all parts into a technological innovation work environment (Martínez-Caro et al., 2020).

Employee Creativity has been defined as, “introducing new and useful ideas which improve the overall effectiveness of the organizational processes” (Chaubey et al., 2019). According to Yang et al. (2018), Organization culture is described as, a “set of shared assumptions and understanding about organization functioning”.

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Employees in a specific cultural environment are thus inextricably affected by the cultural environment in which people live, on either a personal or corporate basis. The success of any technological innovation has direct linkages with the organizational culture in which this innovation is being implemented. Lengthy goals and advanced process improvement, cooperation, communications, risk acceptance, tolerance, and responsibility, and increasing personal understanding are the key attributes of organizational culture (Kumar et al., 2021; Le et al., 2020; Tian et al., 2018).

Singh et al. (2021) defined competitive pressure as, “the perceived pressure from business competitors that forces a firm to adapt to new technology for sake of maintaining competitiveness”. It refers to the amount of competition in the marketplace. Organizations are adjusting to address the competitive pressures posed by new technological innovations in the modern age (Chu et al., 2018). Cognitive readiness has also been described as, “the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent performance in the complex and unpredictable environment of modern military operations” (Crameri et al., 2021). It is a conceptual model that may be used to judge people's talents in such situations of ambiguity especially when a change in the shape of technological innovation is happening in the organization.

Organization mindfulness is defined as, “a dynamic process comprising specific ongoing actions rather than an enduring organizational characteristic” (Li et al., 2021). Regularly assessing and analyzing possible risks and possibilities, developing dependable reaction alternatives, and recognizing the presence of the problem are all examples of organizational mindfulness (Ndubisi & Al-Shuridah, 2019). From its explained characteristics mindfulness is expected to have significant associations with technological innovation and organizational performance. Strategic alignment describes as, “the extent to which a firm's overall business, product, and technology guide the product development contents and processes” (McAdam et al., 2019). Industry strategic alignment can lead to inadequate demand and consumer concentration, as well as a loss of profitability. IT Readiness defines as, “the strength of the IT portfolio to facilitate the digital innovation” (Lokuge et al., 2019). It is the existence of institutions and aspects within a company that allows it to properly utilize digital resources for any new technology innovation and to enhance firm performance.

Finally, the current study has been established on the Self-determination theory and social learning theory. Social learning theory (SLT) is defined as “how both environmental and cognitive factors interact to influence human learning and behavior” (Maisto et al., 1999). Self-determination theory (SDT) “details the origins and outcomes of human agentic action. Basic psychological needs for autonomy, competence, and relatedness in Self-Determination Theory are introduced as is the relationship of need satisfaction to intrinsic motivation and the regulation of extrinsic motivation” (Adams et al., 2017).

Hence, this study attempts to investigate the antecedents of technological innovation and their further impact on organizational performance in employees of the innovative agriculture industry in Spain and Italy. This context is also a unique combination of advancement in theory and evidence related to the explained phenomenon under investigation in this research (Khin & Ho, 2019; Labianca et al., 2020; Pölling et al., 2017). Thus, besides theoretical advancement rooted in these two above-mentioned theories, this research is incremental for its contextual advancement to provide technological innovation from Spain, and Italy contexts.

The current study aims to shed light to explore and achieve the following research objectives:

- What are the key factors impacting technological innovation?
- How technological innovation leads to organizational performance?

2. Literature Review and Research Framework

The focus of this research is on employee creativity, organizational culture, competitive pressure, cognitive readiness, organizational mindfulness, strategic alignment, and IT readiness, and its impact on technological innovation as a mediator and further impact on organizational performance. The present study has been established on theories of Self-determination theory and social learning theory. Social learning theory is a framework that aids in the explanation and prediction of human behavior (Maisto et al., 1999). Employees' creativity, according to social learning theories, cannot be considered individuals; rather, they must be seen as constituent components of teams, organizations, communities, and families (Maisto et al., 1999). As a result, the purpose of this research is to look into employee creativity, organizational culture, competitive pressure, cognitive readiness, organizational mindfulness, strategic alignment, IT readiness, and its impact on technological innovation. Self-determination theory (SDT) is an “empirically derived theory of human motivation and personality in social contexts that differentiates motivation in terms of being autonomous and controlled” (Adams et al., 2017).

2.1. Employee Creativity and Technological Innovation

The research on employee creativity has primarily focused on its antecedents including its consequence. While some researchers contend that employee creativity and technological innovation are two separate concepts, many others believe that both are so tightly connected that they're being deployed simultaneously (Chaubey et al., 2019). Increased employee creativity does result in significant technological innovation. Past research suggests that employee creativity and technological innovation complement one another over the period (Hong et al., 2018). The application of creative ideas results in unique technology innovation; the behavior of the surroundings (e.g., market, customers) to the items might respond to another phase of creativeness for unique and advanced goods, which in turn results in additional technological innovation. According to Rietzschel et al. (2010), there is a relationship between employee creativity and technological innovation. In previous studies employee creativity positively influence technological innovation (Chaubey et al., 2019; Kremer et al., 2019; Rietzschel et al., 2010).

Based on the above literature present study expects to propose that employee creativity will have a positive influence on technological innovation and organizational performance. It is proposed that;

H1a: Employee creativity is positively related to technological innovation.

2.2. Organization culture and Technological Innovation

Organizational culture has been seen as the core of organizations since it shares a common identity, creates quality management for workers to report, and determines how a company makes deals. Since it can organize the participation of all representatives for objectives, it is a source of unity (Tian et al., 2018). As a result, businesses' potential to develop will be considerably enhanced. Organizational culture appears to be a key determinant in any company's development, and it is at the core of corporate development. As a result, it's not unexpected that the majority of these sample papers deal with this degree of conceptual research and its connections to technological innovation (Martínez-Caro et al., 2020). It can help workers meet and engage with the customers they need to be effective in their change. In the recognized research, researchers have used many characteristics of organizational culture to investigate technological innovation. Previous studies shows a positive effect on organizational culture (Martínez-Caro et al., 2020; Tian et al., 2018; Yang et al., 2018). Hence, it is proposed that;

H2a: Organizational culture is positively related to technological innovation.

2.3. Competitive pressure and Technological Innovation

Singh et al. (2021) defined competitive pressure as, “the perceived pressure from business competitors that forces a firm to adapt to new technology for sake of maintaining competitiveness”. It

refers to the amount of competition in the marketplace. Organizations are adjusting to address the competitive pressures posed by new technological innovations in the modern age (Chu et al., 2018). The competitive pressure put on enterprises by key worldwide values motivates them to invest in technology and interact with customers (Chu et al., 2018). Previous studies suggest that competitive pressure has a positive effect on technological innovation (Chu et al., 2018; Danso et al., 2020; Martínez-Caro et al., 2020; Singh et al., 2021). Therefore, it is proposed that;

H3a: Competitive pressure is positively related to technological innovation.

2.4. Cognitive Readiness and Technological Innovation

Cognitive readiness is a unique, scarce, uncountable, and inimitable material that can assist in achieving long-term competitiveness. Workers' aptitude, adaptation, and understanding are used to determine intellectual competence. It is a conceptual model that may be used to judge people's talents in such situations (Lokuge et al., 2019). Cognitive readiness is also described as, "the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent performance in the complex and unpredictable environment of modern military operations" (Cramer et al., 2021). As a result, organizational readiness for technological innovation is not a one-size-fits-all concept. In previous studies, cognitive readiness has a positive effect on technological innovation (Hong et al., 2018; Lokuge et al., 2019; Singh et al., 2021). Hence, we also hypothesize that;

H4a: Cognitive readiness is positively related to technological innovation.

2.5. Organization mindfulness and Technological Innovation

Organization mindfulness is described as "the extent to which an organization captured discriminatory details about emerging threats and creates a capability to swiftly act in response to these details" (Singh et al., 2021). Regularly assessing and analyzing possible risks and possibilities, developing dependable reaction alternatives, and recognizing the presence of the problem are all examples of organizational mindfulness (Ndubisi & Al-Shuridah, 2019). It has been characterized as a very steady and long-lasting organizational feature that arises from upper executives or administrator-implemented guidelines and processes (Ndubisi & Al-Shuridah, 2019). As technological innovation also comes from top to bottom thus it has strong ties with mental models of management and is hence expected to have a positive association with technological innovation. As a consequence, it is proposed that;

H5a: Organizational mindfulness is positively related to technological innovation.

2.6. Strategic Alignment and Technological Innovation

Strategic alignment is described as "the state in which a high-quality set of inter-related IT and business plans exist" (Singh et al., 2021). The organization should strive to maximize actions that promote alignment while minimizing those that obstruct it. Full engagement in marketing strategy and prioritizing improvement efforts might help to increase consistency. The efficient use of technological innovation and the corporate plan for organizations' performance can be ensured by strategic alignment (Lokuge et al., 2019; McAdam et al., 2019). Even if it might keep the dynamic and linked structure of the connections among numerous elements, strategic alignment with factors has more meaning (Al-Surmi et al., 2020). In prior studies, strategic alignment has a significant positive impact on technological innovation (Al-Surmi et al., 2020; McAdam et al., 2019; Nguyen et al., 2020; Singh et al., 2021). As a consequence, it is suggested that;

H6a: Strategic alignment is positively related to technological innovation.

2.7. IT Readiness and Technological Innovation

In an organizational context, IT readiness is defined as "the availability of a set of strategic, organizational, and structural elements that are pre-requisites for SMEs to fully leverage the potential

of ICT” (Dyerson et al., 2016). The availability of processes and features inside an organization that enable enterprises to fully leverage information systems is known as IT readiness. The company has the opportunity to react to upcoming developments through the combination of the company's IT with positive and productive diverse notions of IT readiness. In this context, “readiness” refers to a technical capability to seize possibilities as they arise (Spinelli et al., 2013). Companies with adequate IT capabilities can adopt technological innovations such as advanced analytics and new platforms. Companies with current and upgraded IT systems have a competitive advantage because they can restructure business strategies and rework current products & services into computer-generated alternatives (Singh et al., 2021). Thus based on the above literature support following hypothesis is suggested;

H7a: IT Readiness is positively related to technological innovation.

2.8. Technological Innovation and Organizational Performance

Digital capacity and technological attitude are consistent and complementary in attaining the innovation process because information direction has been shown to activate and facilitate innovation (Liao et al., 2010). Technological Innovation has been defined “as the successful implementation of creative ideas within an organization” (Ghosh, 2015). Similarly, organizational performance describes as, “(a) financial performance (profits, return on assets, return on investment, etc.); (b) product-market performance (sales, market share, etc.); and (c) shareholder return (total shareholder return, economic value-added, etc.)” (Richard et al., 2009). The vast majority of actual studies show how innovation impacts organizational performance. According to Danso et al. (2020), innovation can help businesses improve their organizational capacities, resulting in more efficient and timely responses to external challenges and higher organizational performance. Similarly, Kahn (2018) suggests that innovation enterprises are better positioned to meet shifting client expectations, resulting in increased corporate value. Past studies show that technological innovation has a positive impact on organizational performance (Hong et al., 2018; Kahn, 2018; Martínez-Caro et al., 2020; Rajiani & Ismail, 2019; Richard et al., 2009). Based on this literature support it is suggested that;

H8a: Technological innovation is positively related to organizational performance.

2.9. Mediation of Technological innovation between antecedents and organizational performance

Employees' creativity makes sure that employees produce new ideas, use those methods to improve techniques, and therefore contribute to innovation (Iqbal, 2019). Employee creativity is the ability to come up with new skills that improve Problem-solving suggestions. On the other hand, technological innovation is the ability to put something new into practice as well as the realization of creations. Therefore, as a connecting factor, research to analyze the connection across technology innovation, organizational performance, and employee creativity (Imran et al., 2018). The relationship between technological innovation, firm performance, and employee creativity, states that there is a favorable correlation (Hong et al., 2018; Imran et al., 2018; Iqbal, 2019).

The concept of organizational performance is linked to a company's high viability and achievement. Teamwork is valued more than contributions in the organizational culture, which encourages influence on decisions and focuses on activities (Ahmad, 2012). It can assist in the integration of IT into technological innovation and empower employees by proactively connecting their thoughts with the company's goals. organizational cultures are founded on processes that can assist describe how people make decisions and think (Nikpour, 2017). Past studies also mentioned that differing levels of culture, which are defined by a complex set of principles, ideals, and expectations, can influence how businesses operate. organizational Performance measures, on the other hand, include standards achievements, and behaviors, as well as knowledge transfer and learning and reinforcement learning ideas and methods for establishing important performance administration abilities through technological innovation (Kremer et al., 2019; Martínez-Caro et al., 2020; Nikpour, 2017).

Competitive pressure forces businesses to reconsider their operations and strive for a more customer base. These companies raised the bar for becoming the best in the business, preventing competitors in

the market by pushing the boundaries and boosting the obstacles to the entrance (Gribbling & Duberley, 2020). There is little data on the mediation of technological innovation with organizational performance and competitive pressure in the setting of technology innovation. Khin and Ho (2019), for example, show proof that organizations that aim to maximize their technological perceived benefit the most and have bigger results than the ordinary organization, and that online profiles, as well as technical skills, are important. Technological innovation increases organizational performance and competitive pressure (Valmohammadi, 2017).

Organizational readiness for technological innovation is characterized as “an organization's assessment of its state of readiness for effective creation or adoption, assimilation, and exploitation of digital technology for innovation” (Lokuge et al., 2019). The technological innovation necessitates the function of various cognitive readiness among employees for them to comprehend and aid the whole process of transition. Although it is understood that several variables affect the development, acceptance, absorption, and use of technological innovation, the readiness assumptions are derived using the discipline of the readiness concept (Martínez-Caro et al., 2020). If the company has the necessary experience and competencies, it will be able to successfully integrate technological advances while also altering procedures, activities, goods, and solutions. This will help make the process faster, resulting in increased efficiency and lower operating costs.

Organizational Mindfulness is “the quality of bearing in mind or bringing to mind; it is the state of recollecting, the state of remembering, the state of nonfading, the state of non-forgetting” (Ndubisi & Al-Shuridah, 2019). Organizational mindfulness improves the business image, which contributes to improved reactions from key parties such as suppliers, workers, and providers, resulting in improved firm performance (Li et al., 2021). Mindfulness in the workplace improves the business image, which in turn encourages favorable results from key parties such as suppliers, coworkers, and vendors, resulting in improved organizational performance. The advancement and growth of an organization are measured by organizational performance (Danso et al., 2020). When evaluating a firm's performance, its goals must be considered. The improved environment helps the business to be conscious at all instances and stay ahead of the competition, as the analytical and statistical systems provide knowledge and belief that the way, allowing the business to perform at a higher level (Obiora, 2021).

According to academic research, companies with a greater process of strategic alignment outperform those with a lesser process of strategic alignment (McAdam et al., 2019). Various aspects or functional areas, such as planning, promotion, and innovations, might help a company achieve better results, however, alignment can contribute to bad results. Companies will be able to efficiently implement automation and understand the benefits of technological innovation if their marketing plans and development strategies are aligned. A successful implementation that is linked with the plan will reduce challenges within a company, resulting in higher technology, method, and rate faster (Al-Surmi et al., 2020). The establishment of clean technology innovation emphasizes developing and long-term placement as a performance measure. As a result, we'll have a deeper knowledge of the elements that influence whether or not businesses are prepared to engage in technological innovation (Al-Surmi et al., 2020; McAdam et al., 2019; Nguyen et al., 2020; Singh et al., 2021).

IT readiness boosts the performance of monitored and regulated activities by facilitating collaboration, providing greater control over distributed activities, and improving accounting, Management, and condition control. If organizations are very well with technology issues and have a high level of technical competency, adding more innovations is likely to provide fewer obstacles to the organization. The network is supposed to be flexible with technological improvements, and the personnel is required to be knowledgeable about how to use them (Dyerson et al., 2016). The implementation of technological innovation will allow for more effective usage of the innovative plan while also boosting present corporate growth. To put it another way, we're curious about the level where a business may gain potential advantages from earlier investments in IT readiness and expertise. In broader operational terms, this means that the company has access to current IT technologies and, more critically, knows what to deal with them (Singh et al., 2021; Valmohammadi, 2017).

Thus above research supports theoretical conceptualizations providing support to propose that

organizational performance is linked with antecedents through technological innovation. Hence, the following hypotheses are suggested;

H1b. Technological innovation has a mediating role in the relationship between employee creativity and organizational performance.

H2b. Technological innovation has a mediating role in the relationship between organizational culture and organizational performance.

H3b. Technological innovation will mediate the relationship between competitive pressure and organizational performance.

H4b. Technological innovation mediates the relationship between cognitive readiness and organizational performance.

H5b. Technological innovation mediates the relationship between organizational mindfulness and organizational performance.

H6b. Technological innovation has a mediating role in the relationship between strategic alignment and organizational performance.

H7b. Technological innovation has a mediating role in the relationship between IT readiness and organizational performance.

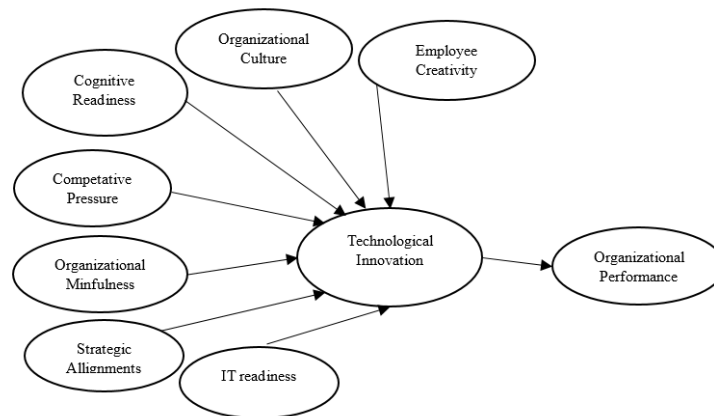


Figure 1: Theoretical Framework of the Study

3. Research Methodology

Participants and Procedure

In this study agribusiness businesses with marketing strategies that are well suited to urban surroundings were chosen. The selection was based on national and international experience, as well as established connections in actual agriculture enterprises, and grounded in a multifaceted approach to analyzing a variety of business scenarios in the agriculture industry in Spain and Italy (Labianca et al., 2020). Several good practices of farm enterprises are presented in this overview, demonstrating significant approaches in city areas, including how they use the customer opportunities of market places while avoiding the limits imposed by the urban setting in the agriculture industry in Spain and Italy (Pölling et al., 2017).

To acquire official approval to engage their personnel in this investigation, a statement detailing the study's goals was drawn and sent to the management of innovative agriculture companies in Spain and Italy to seek their willingness to voluntarily participate in this research. The secrecy of the identity of companies and personnel was guaranteed. It was guaranteed that no personally identifiable information will be used or published or will not be shared with any third party at any stage of this research project. The survey's official language was English, and all participants were determined to be effective English users in the agriculture industry. The email contacts of the employees were obtained from the management of agriculture companies that consented to participate in this study.

An aggregate of 700 people was contacted by email, and a survey was sent including a covering note

detailing the objectives of the research and seeking individual willingness to participate in this research. The researchers gained permission from 650 employees for voluntary participation in this study. On October 10, 2020, the data collection procedure began, and 600 completed surveys were collected by January 1, 2021. 20 replies were removed from the final data based on first observations of disengaged and half-filled replies. As a result, the final response rate was 580, with 82 percent of respondents.

Measures of the Study

A 28-item questionnaire was devised to analyze the antecedents of technological innovation and its further impact on organizational performance in employees of the agriculture industry are taken into account in Spain and Italy. The responses were taken on a “7-point Likert scale ranging from 1= Strongly Disagree to 7 = Strongly agree”. Items for the questionnaire were adapted from previously validated scales, employee creativity from Zhou & George (2001), Organizational Culture, Competitive pressure, Cognitive readiness, Organization mindfulness, Strategic alignment, IT Readiness, and firm performance were adopted from Singh et al. (2021). While technological innovation was adopted by Jiang et al. (2012). Detailed items are available in Appendix A.

4. Data Analysis and Results

The study's primary findings were then divided into two sections, the first of which explained the measurement model and the second of which explained the structural model. The measurement and structural model were evaluated using SmartPLS3.

4.1. Measurement Model

The reported simulated review showed that participants' gender, marital status, and residence all had a significant impact on technological innovation; thus, all three demographic parameters were controlled throughout the investigation.

Table 1: Demographic Profile

Demography	Description	No. of Responses	%
Gender	Male	250	43.1
	Female	330	56.9
Marital Status	Married	370	63.8
	Not Married	210	36.2

Furthermore, in the measurement model, Cronbach's Alpha (α) and composite reliability (CR) were computed to evaluate the measurements' consistency (Henseler et al., 2015). CR and α for all research constructs were greater than 0.7, indicating that they meet the required reliability criterion.

Table 2: Composite Reliability, α , and AVE values

Constructs	α	AVE	CR	AVE SQRT
Cognitive Readiness	0.785	0.766	0.702	0.607
Competitive Pressure	0.701	0.770	0.826	0.614
Employee Creativity	0.805	0.813	0.873	0.634
IT Readiness	0.774	0.788	0.868	0.687
Organizational Culture	0.707	0.715	0.836	0.631
Organizational Mindfulness	0.733	0.707	0.787	0.555
Organizational Performance	0.810	0.816	0.887	0.725
Strategic Alignments	0.774	0.771	0.776	0.536
Technological Innovation	0.784	0.787	0.903	0.822

CR=composite reliability; AVE=average variance extracted

To determine the constructs' convergent validity, factor loadings and Average Variance Extracted (AVE) were determined (Sarstedt et al., 2017). All factor loading of the study constructs was over the minimal criterion of 0.70 in both investigations, and AVE was above 0.50. (Henseler et al., 2015). A full description of the validity and reliability measurements is given in Table 2.

Moreover, discriminant validity is indicated when the square root of AVE is greater than the value of latent variables correlation (Fornell and Larcker, 1981).

Table 3: Discriminant Validity

	CR	CP	EC	ITR	OC	OM	OP	SA	TI
CR	0.638								
CP	0.307	0.784							
EC	0.454	0.351	0.796						
ITR	0.463	0.165	0.256	0.829					
OC	0.494	0.190	0.388	0.310	0.794				
OM	0.478	0.209	0.363	0.506	0.409	0.745			
OP	0.826	0.245	0.574	0.501	0.478	0.489	0.851		
SA	0.451	0.186	0.389	0.583	0.349	0.500	0.527	0.732	
TI	0.632	0.179	0.496	0.500	0.453	0.376	0.710	0.530	0.907

CR=Competitive Readiness; CP= Cognitive Pressure; EC= Employee Creativity; ITR= IT Readiness; OC= Organizational Culture; OM= Organizational Mindfulness; OP= Organizational Performance; SA= Strategic Alignment; TI=Technological Innovation

4.2. Assessment of Structural Model

This part focuses on the structural model used in the study's hypothesized model to highlight the relationship. The bootstrapping approach with 500 sub-samples was used to identify significance levels (Henseler et al., 2015; Mansoor & Paul, 2021). T-values larger than 1.94 are deemed statistically significant, according to Hair et al. (2017) which are then utilized to make choices on the proposed hypothesis. We also checked β the coefficient and p-values to review the results for the proposed hypothesis. Furthermore, R^2 was determined to evaluate the whole conceptual framework's efficiency. Also used is “mediation analysis” for how mediating impact increased the impact on dependent and independent variables (Hair et al., 2021).

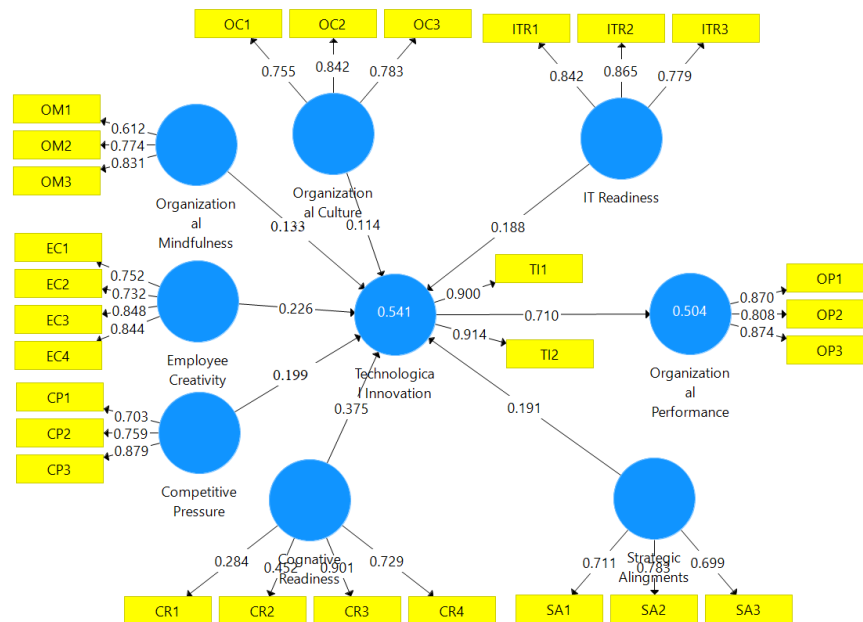


Figure 2: Standardized effects of proposed relationships

The results shows according to the analysis that competitive readiness ($\beta = 0.375$, $P = 0.000$), cognitive pressure ($\beta = 0.199$, $P = 0.008$), employee creativity ($\beta = 0.226$, $P = 0.001$), IT readiness

($\beta = 0.188$, $P = 0.002$), Organizational Culture ($\beta = 0.114$, $P = 0.023$), organizational mindfulness ($\beta = 0.133$, $P = 0.004$), strategic alignment ($\beta = 0.191$, $P = 0.002$), have a positive and significant impact on Technological Innovation, thus hypotheses 1a, 2a, 3a, 4a, 5a, 6a and 7a are accepted by this study results. On the other hand, technological innovation ($\beta = 0.710$, $P = 0.000$) has a positive and significant impact on organizational performance, thus providing support for hypothesis 8 of this research. The standardized effects of direct relationships are shown in figure 2, while detailed significance analysis results are shown in Table 4.

Table 4: Direct Hypothesis Testing

	β -Value	Sample Mean	Standard Deviation	T value	P-value	Result
CR -> TI	0.375	0.378	0.062	6.072	0.000	Accept
CP-> TI	0.199	0.191	0.054	2.513	0.008	Accept
EC -> TI	0.226	0.217	0.067	3.356	0.001	Accept
ITR -> TI	0.188	0.181	0.060	3.159	0.002	Accept
OC -> TI	0.114	0.116	0.050	2.285	0.023	Accept
OM -> TI	0.133	0.131	0.065	2.624	0.004	Accept
SA -> TI	0.191	0.196	0.062	3.064	0.002	Accept
TI -> OP	0.710	0.713	0.035	20.065	0.000	Accept

CR=Competitive Readiness; CP= Cognitive Pressure; EC= Employee Creativity; ITR= IT Readiness; OC= Organizational Culture; OM= Organizational Mindfulness; OP= Organizational Performance; SA= Strategic Alignment; TI=Technological Innovation

Mediator Hypothesis Testing

Table 5 shows that technological innovation ($\beta = 0.266$, $P = 0.000$) mediates the relationship between competitive readiness and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.158$, $P = 0.001$) mediates the relationship between cognitive pressure and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.134$, $P = 0.001$) mediates the relationship between IT readiness and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.175$, $P = 0.002$) mediates the relationship between organization mindfulness and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.160$, $P = 0.001$) mediates the relationship between employee creativity and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.081$, $P = 0.024$) mediates the relationship between organizational culture and Organizational Performance, so this hypothesis is accepted. Technological innovation ($\beta = 0.136$, $P = 0.003$) mediates the relationship between strategic alignment and Organizational Performance, so this hypothesis is accepted.

Table 5: Mediator Hypothesis Testing

	β Value	Sample Mean	Standard Deviation	T value	P-value	Result
CR-> TI -> OP	0.266	0.271	0.051	5.223	0.000	Accept
CP -> TI -> OP	0.158	0.247	0.048	2.512	0.001	Accept
ITR-> TI -> OP	0.134	0.128	0.042	3.215	0.001	Accept
OM -> TI -> OP	0.175	0.170	0.046	2.638	0.002	Accept
EC -> TI -> OP	0.160	0.154	0.048	3.366	0.001	Accept
OC -> TI -> OP	0.081	0.083	0.036	2.258	0.024	Accept
SA -> TI -> OP	0.136	0.140	0.045	3.016	0.003	Accept

CR=Competitive Readiness; CP= Cognitive Pressure; EC= Employee Creativity; ITR= IT Readiness; OC= Organizational Culture; OM= Organizational Mindfulness; OP= Organizational Performance; SA= Strategic Alignment; TI=Technological Innovation

4.3. Assessment of R^2

The second stage in analyzing a structural model is to determine the R^2 (Hair et al., 2011). The variance in endogenous constructs caused by external constructs is represented by the coefficient of

determination (Hair et al., 2011). Rigdon (2012) stated that the coefficient of determination is also recognized as a sample's predictive power. If the coefficient of determination is greater, the predictive power of the sample is also greater. The coefficient of determination for endogenous constructs is given in table 6.

Table 6: Assessment of R square

	R ²
Organizational Performance	0.504
Technological Innovation	0.541

5. Implications, Limitations, and Future Research Directions

This part continues with the study's significance, acknowledges its limits, and concludes with suggestions for future research.

Findings of the Study

The existing study's findings reveal a significant relationship between antecedents (i.e. employee creativity, organizational culture, competitive pressure, cognitive readiness, organizational mindfulness, strategic alignment, IT readiness) and technological innovation as well as technological innovation and organizational performance. Furthermore, demographic data suggested that males are more likely than females to use technological innovation in Spain, and Italy firms. Additionally, technological innovation mediation has also been proved in between antecedents and organizational performance.

Theoretical Implications

This research has attempted several theoretical contributions to the body of knowledge. Firstly, this research attempt is among the earliest theoretical advances to combine and integrate several antecedents in a single theoretical framework. Past studies have considered all those antecedents separately or in different groups. The second major advance of this research was to bridge the gap between several attitudes, behaviors, capacities, and organizational factors together with technological innovation. It has helped to bridge the theoretical gaps between innovation management, technology management, and organizational performance literature. The third major advance made by this study was to propose and test the mediation of technology innovation between antecedents and organizational performance. This extended relationship exploration is a unique theoretical contribution and helped to provide empirical evidence from the European setting of innovative agriculture companies. Such research attempts in this sector and technology innovation literature are very scarce. Finally, this research contributed to bringing together two diverse theories social learning and self-determination theory in a single framework. This integration has resulted in opening further avenues of future research in the technology innovation theoretical landscape.

Practical implications

In addition, this study provides policymakers, practitioners, and managers with useful insights in a variety of ways. To begin, the current study demonstrates that technological innovation is the most essential component in elaborating the idea of organizational performance in determining the success of innovation in the agriculture sector of European countries such as Spain, and Italy. As a result, administrators and policymakers should look for criteria while implementing the usage of technological innovation: employee creativity, organizational culture, competitive pressure, cognitive readiness, organizational mindfulness, strategic alignment, and IT readiness, were found to be the most critical determinants of the use technology in organizational performance in Spain, and Italy firms. The agri-business entrepreneurs and managers may look for attributes such as creativity, mindfulness, readiness, and organizational factors such as strategic alignment, competitive pressures, and IT readiness of companies to explore the optimum benefits from technological innovation. Another important factor that accounts for both individual-level and organizational level antecedents is an organizational culture which plays a critical role in determining the success of technology innovation as well as helps in organizational performance. Thus, a close evaluation of all factors may help in devising training and development focused on attaining competitive advantage through

antecedents mentioned in this study may help to achieve organizational goals.

Limitations and Future Research Directions

In addition to its many great aspects, the current study, like all others, has significant flaws that must be addressed in future research efforts. The current study was conducted among users of technological innovation in several companies in Spain and Italy related to the agriculture sector. So generalizing study results to other sectors may be an issue. Future research may include a diverse sample from various aspects of technical innovation, as well as consumers of technology in multiple businesses, to reach generalizable results. Second, the data were obtained at a single point in time, despite the fact, that future researchers may employ a longitudinal study design to determine causation with more accuracy. In future studies, researchers should consider variables that may moderate the effects to obtain more significant results. Because it is more usual in industrialized countries to apply creativity for technological advancement. The study's goal was to look into these geographical differences to broaden the scope of the findings, which included assessing several countries, focusing on technological innovation in developing countries, and conducting comparative analyses of emerging and industrialized national contexts that can be an interesting area of future research. Future studies may also consider these antecedents with technology adoption constructs for a better contribution toward an inclusive digital society.

5.1. Conclusion

The findings of this study's empirical findings describe the significance of relationships between employee creativity, organizational culture, competitive pressure, cognitive readiness, organizational mindfulness, strategic alignment, and IT readiness, as well as their impact on organizational innovation and performance. Scholars and practitioners are becoming more interested in technological innovation and its antecedents and outcomes for organizations. Companies are obliged to overhaul their policies and rebuild their marketing strategies in the modern age to achieve organizational performance through technological innovation. The key insights from this research build trust in business leaders that technological innovation has a bright future and that involvement of management in implementing technological innovation will help the companies flourish in the highly competitive digital era of industry 4.0. The research lays a solid platform for policy development and the creation of a comprehensive technological innovation for several theoretical and practical insights for organizations.

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Appendix A

Variables	Items	Sources
Employee Creativity	1. Suggests new ways to achieve goals or objectives.	(Zhou & George, 2001)
	2. Comes up with new and practical ideas to improve performance.	
	3. Searches out new technologies, processes, techniques, and/or product ideas.	
	4. Suggests new ways to increase quality.	
Organization Culture	1. The employees give inputs to the decisions that affect them.	(Singh et al., 2021)
	2. The employees have a high level of agreement on the way things are done.	
	3. The company has a long-term purpose and direction.	
Competitive Pressure	1. Percentage of competitors in industry are conducting internet-based selling.	(Singh et al., 2021)
	2. Percentage of competitors in industry are conducting internet-based procurement and coordination.	
	3. Percentage of competitors in industry are conducting internet-based services.	
Cognitive Readiness	1. There is a shared vision of what this organization will be like in the future.	(Singh et al., 2021)
	2. The employees have the appropriate knowledge (i.e., technical, business process, and organizational) to facilitate innovations.	
	3. The employees have the appropriate skills to facilitate innovations.	
	4. The employees have the appropriate adaptability to facilitate innovation.	
Organization Mindfulness	1. The employees can accurately anticipate digital transformation.	(Singh et al., 2021)
	2. The employees make sure that the firm's strategic plan identifies value from digital transformation.	
	3. The employees inform management team about the valuable options of digital technology before a digital transformation's strategic decision is mad.	
STRATEGIC ALIGNment	1. The digital technology and business strategy are integrated to attain strategic alignment.	(Singh et al., 2021)
	2. The shared vision of the role of digital technology in business strategy is created.	
	3. The impact of digital technology on business strategy is jointly planned.	
IT Readiness	1. Enterprise system/s is/are stable, up-to-date, and reliable.	(Singh et al., 2021)
	2. The employees have access to a range of new technologies like cloud, mobile, social media, and big data analytics available to facilitate innovations.	
	3. The employees believe that IT infrastructure is stable, up-to-date, and reliable to facilitate innovations.	
Technological Innovation	1. Our company often offers new products or services to the customers.	(Jiang et al., 2012)
	2. New products and services contribute a lot to our company's profit.	
Firm Performance	1. The growth is more as compared to competitors.	(Singh et al., 2021)
	2. The profitability is more as compared to competitors.	
	3. The productivity is higher as compared to competitors.	