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National Culture and Technological Entrepreneurial Orientation: A Study Utilising Hofstede's Theoretical Framework

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Abstract

Background: The expansive advancement of technology has prompted scholars to investigate the links between external factors that influence the success of technology-based entrepreneurs, with particular emphasis on the link between national culture and technological entrepreneurial orientation.

Purpose: This paper examines the relationship between national culture and technological entrepreneurial orientation during the early stages of entrepreneurial activity, utilizing Hofstede's national culture dimensions as a theoretical framework.

Study design/methodology/approach: The empirical analysis was conducted using multiple linear regression, based on data obtained from the Global Entrepreneurship Monitor (GEM) database. The sample comprises 8,000 participants from Southeastern Europe.

Findings/conclusions: The research findings indicate a statistically significant relationship between national culture and technological entrepreneurial orientation. A similar standard of living, associated with a lower index of power distance, is positively linked to technological entrepreneurial orientation, whereas the perception of entrepreneurship as a desirable professional career, typical of an individualistic society, is statistically significant but negatively associated with technological entrepreneurial orientation. A lower index of Power distance encourages innovativeness and efficiency in entrepreneurial ventures within high-tech sectors; conversely, Individualistic societies lead to a greater prevalence of enterprises in low-tech sectors.

Limitations/future research: A group of drivers of technological entrepreneurial orientation was examined. We recommend that future research, in addition to national culture, also considers other factors, such as individual or sociodemographic factors.

Keywords
National culture, Technological Entrepreneurial Orientation, Hofstede's culture dimensions, Southeast Europe, GEM

Introduction

The expansive advancement of technology has prompted scholars to investigate the links between external factors that influence the success of technology-based entrepreneurs (Cardon, 2008; Steers, et al., 2008; Abbasi, et al., 2015; Ma & Turel, 2019; Jan, et al., 2022), with particular emphasis on the link between national culture and technological entrepreneurial orientation (Steers et al., 2008; Halac, 2015). Technological entrepreneurial orientation (TEO) refers to an individual's ability to recognise, adopt, and utilise new technologies. TEO is a crucial construct of superior performance in the contemporary economy (Zhou, et al., 2005), essential for long-term growth, sustainability, and development in the early stages of entrepreneurial activities (Kraus, et al., 2019). In the literature, TEO is often associated with the final results of the product innovation process. However, it also refers to the application, improvement and/or transfer of technologies that will be used in these processes (Halac, 2015, Raković, et al., 2022, Nigbor Drożdż, et al., 2024).

TEO can be measured using various methodologies, but Hofstede's theoretical framework is one of the most common and is widely employed across several fields, including cross-cultural management, international business, and cross-cultural psychology (Taras, et al., 2012; Beugelsdijk & Welzel, 2018; Lee, et al., 2022; Espig, et al., 2022; Bate, et al., 2025). Geert Hofstede was a Dutch social psychologist who conducted pioneering research on cultures. His concepts regarding dimensions of culture were so radical that seventeen publishers rejected the manuscript before a visionary at Sage accepted it. The book was published in 1980, and the rest is history (Hofstede, n.d.-a, pp. 2-3). Hofstede analysed the cultural orientations of managers, employing the 6-D Model of National Culture, which comprises: Individualism/Collectivism, Power Distance, Masculinity/Femininity, Uncertainty Avoidance, Long-term/Short-term Orientation, and Indulgence/Restraint (Hofstede, et al., 2010; Hofstede, 2011; Hofstede, n.d.-c). Numerous scholars have utilized dimensions to explore the links between national culture and technology, including: the effects of Individualism and Collectivism on an individual's Technology Acceptance Behaviour (Abbasi et al., 2015), the implications of individualism and collectivism on the effectiveness of technology-mediated learning (Hornik & Tupciu, 2006), the relationship between national culture and uncertainty avoidance in technology acceptance (Cardon, 2008), etc. Hofstede (2001) posits that countries characterised by low Power distance-those promoting egalitarian social structures-and a high degree of uncertainty avoidance-reflecting a strong preference for stability and predictability-are more likely to prioritise both the advancement and adoption of technology. In contrast, societies that uphold hierarchical structures or demonstrate a greater tolerance for ambiguity and uncertainty tend to place less emphasis on these technological pursuits.

Over time, Hofstede's model has also prompted researchers to make various modifications (McSweeney, 2002; Dimitrov, 2014; Minkov, 2018; Bojadjiev, et al., 2023). For example, Hofstede's 6-D model of national culture was modified into a three-dimensional framework consisting of (1) Collectivism-Individualism, (2) Duty-Joy, and (3) Distrust-Trust (Beugelsdijk & Welzel, 2018; Cieslik, et al., 2023). Beugelsdijk and Welzel (2018) integrate Inglehart's dynamic concept of culture with Hofstede's dimensional approach, highlighting that this amalgamation addresses their mutual deficiencies. Furthermore, House R. proposed nine cultural dimensions (performance orientation, future orientation, assertiveness, power distance, human orientation, institutional collectivism, in-group collectivism, uncertainty avoidance, and egalitarianism), introducing a GLOBE model that expands upon Hofstede's work (House, et al., 2002). Moreover, Hofstede's framework enables us to understand that the adoption of new technologies is not solely a matter of technical efficiency but also involves cultural values that shape TEO.

Notwithstanding the substantial body of research exploring the relationship between national culture and TEO, studies that specifically focus on the Southeast European region remain notably limited. Moreover, with due respect, there remains a scarcity of research utilising Hofstede's theoretical framework to examine that link. This paper aims to bridge that gap. The primary focus of this research revolves around the capacity of

technology-based entrepreneurs to synchronise their enterprises with prevailing cultural norms and values, while simultaneously responding to the demands imposed by the globalised market, including the proliferation of contemporary technological solutions. The research aims to identify the key factors of national culture that contribute to enhancing the TEO. By identifying these factors, we strive to provide insight into how the cultural context can either serve as an incentive or a barrier to the adoption and application of new technologies. This paper leverages the GEM database, Adult Population Survey (GEM, APS), which encompasses data about national culture and the technological perceptions of entrepreneurs. The subjects of this research are entrepreneurs from Southeast Europe who have undergone significant political and social transformations in recent decades; they have engaged in business during phases of transition and reform, while also confronting the global economic crisis (World Bank Group, 2016).

Thus, the questions arising in this paper are: Which national culture dimensions, according to Hofstede's theoretical framework, contribute to TEO? How do factors such as Individualistic societies or Power distance affect entrepreneurs' likelihood of entering high- or low-technology sectors?

This paper begins with a theoretical overview of Hofstede's theoretical framework and national culture dimensions. This is followed by the presentation of the methodology, research findings, and a discussion of the results. The paper concludes with final remarks and offers recommendations for future research.

1. Literature review

In global competition, technology-based entrepreneurs often face barriers such as national cultural specificities, specific attitudes, characteristic values, among others. National culture as a set of values, norms, and beliefs characterises a society and makes it recognisable in a wider context. It embodies the shared cognitive framework of a population that differentiates them from other groups (Hofstede, 2001), illustrating how a collective approaches problem-solving and navigates challenges (Trompenaars & Hampden-Turner, 1998); it is a heritage shared by a specific group in a particular area (House, et al., 2004). From an economic perspective, the adoption of new technologies and business practices is shaped by the prevailing national culture (Steers et al., 2008; Ozbilen, 2017; Hooks, et al., 2021; Festing & Proff, 2025).

Technology-based entrepreneurs focus on technologically innovative businesses, creating value from the initial stage; they launch new ventures, introduce new applications, and exploit opportunities that rely on scientific and technical knowledge (Bailetti, 2012). These are mostly young enterprises, emphasising early entrepreneurial activity rather than organisational size. In contrast to traditional entrepreneurs, who gradually develop performance and navigate multiple business phases toward success, technology-based entrepreneurs prioritise a proactive entrepreneurial strategy, tending to explore emerging technology opportunities (Liu, et al., 2005, Ognjenović, 2024). They compensate for their lack of financial, human, and other resources with their capacity for learning and the advantage of possessing specific resources and knowledge (Shane & Venkataraman, 2000). TEO is one of the superior performances of technology-based entrepreneurs also influences the competitiveness of organisations (Ogbari, et a., 2022). Halac (2015) indicates that technology orientation is a multidimensional construct, showing that it is a culture-based strategic orientation characterised by top management capability, strong technological capability, and a commitment to learning and change to remain competitive. A technological orientation is a path to competitiveness, ensured by strong beliefs throughout the organisation about managerial and technological capabilities, as well as a commitment to continuous learning.

Hofstede's theoretical framework and his well-established cultural dimensions opened the way to the implications of national culture for TEO.

Collectivism vs. individualism in societies has been conceptualised as the degree to which individuals are integrated into groups (Hofstede, 2001). In collectivistic societies, individuals tend to subordinate their interests to those of the group (Khan & Cox, 2017) and also have a predisposition to value participation and acceptance within social groups (Prim, et al., 2017). Success in a collectivist society is linked to state regulation, adopted laws, strategies, and government programmes. These programmes offer support such as business development services, facilitation of technology transfer, including government initiatives, incubators, and accelerators (Soetanto & Jack, 2016). Entrepreneurs in collectivistic conditions are less preoccupied with the fear of failure and are

freer to take risks when introducing new business trends, innovations, and technologies. On the other hand, an individualistic society supports the independence of the individual, allowing autonomy for generating ideas, thereby boosting innovation performance (Rinne et al., 2012; Prim et al., 2017), personal responsibility, and independent decision-making. Decision-making regarding new technologies occurs within the company, often without wider consultation with institutions or the community. Individuals need not worry about the opinion of the group; they express their own opinions (Andrijauskiene & Dumciuviene, 2017). Namely, personal responsibility and motivation to achieve success contribute to more intensive engagement of entrepreneurs in the development and application of innovations (Andrijauskiene & Dumciuviene, 2017; Khan & Cox, 2017). Hornik and Tupciu (2006) state that the horizontal and vertical dimensions of individualism and collectivism have many implications for how individual learners use and respond to interactive technologies. They explored how cultural dimensions-namely horizontal individualism, vertical individualism, horizontal collectivism, and vertical collectivism - influence the effectiveness of technology-mediated learning (TML); the findings show that these four cultural orientations differently affect the use of TML communication tools, the sense of community experienced by learners, their satisfaction with the TML environment, their perceived learning, and their acquisition of declarative knowledge. Furthermore, Song, Kyung and Yeonbae (2020) analysed the effect of social security on technology-based entrepreneurial activity and found that technology-based ventures require consideration of societal factors in addition to economic factors; they find that social security has a positive effect on the share of technology-based entrepreneurial activity, and that the positive impact of social security shows a gradual decline as individualism increases.

In addition, individualistically oriented societies often have developed mechanisms of market competition, which additionally encourage entrepreneurs to follow technological trends to preserve or improve their market position. In this sense, technology is not only perceived as a tool but as a strategic resource, the use of which directly affects the business performance and long-term sustainability of the company (Kraus et al., 2019, Dukanac et al., 2025). Additionally, some studies suggest that individualistic societies may perceive entrepreneurship as a desirable activity. However, a significant majority of future entrepreneurs opt to start businesses in low-tech sectors due to the quick and safe initiation of entrepreneurship, which primarily refers to the traditional services and products sector. However, Rantanen and Toikko (2017) state that both individualist and collectivist values promote entrepreneurial intentions, namely, a society does not have to be purely collectivist or individualist, due to the fact that organisations can have characteristics of both dimensions (Lee, et al., 2019).

"Long Term Orientation stands for the fostering of virtues oriented towards future rewards, in particular, perseverance and thrift. Its opposite pole, Short Term Orientation, stands for the fostering of virtues related to the past and present, in particular, respect for tradition, preservation of 'face,' and fulfilling social obligations" (Hofstede, 2001, p. 359). Featuring dimension also indicates different entrepreneurial orientations. Zhou et al., (2005) linked different entrepreneurial orientations, through organisational learning, to radical innovations and business success. Research results indicate that market orientation encourages technological innovation, but at the same time inhibits market-based innovation. Then, that technological orientation has a positive effect on technology-based innovations, but does not affect market-based innovations, while entrepreneurial orientation encourages both types of revolutionary innovations.

Long-term oriented cultures strive for the strategic accumulation of resources and the continuous improvement of business ventures. In such an environment, technology is not merely an instrument for short-term profit acquisition but a strategic resource that is constantly evolving. Entrepreneurs in these societies focused on adopting technological platforms, developing patents, and establishing research and development functions. This approach contributes to the creation of a stable, innovative, and technological ecosystem. New technologies enhance the effectiveness of existing production methods and serve as a foundation for the development of new added-value products (Augner, 2010). Consequently, the adoption of new technologies is classified as a long-term entrepreneurial strategy, correlated with the diffusion of new technology-based sustainable products (Jaiswal & Zane, 2022). Furthermore, House et al. (2004) contend that a nation's commitment to acquiring or developing advanced technologies is closely associated with

its cultural emphasis on long-term orientation, a strong inclination to avoid uncertainty, and institutional collectivism. Such an environment with a well-developed long-term entrepreneurial perspective is conducive to the development of TEO.

On the other hand, short-term oriented societies focus on the present. Technology-based entrepreneurs in these societies launch startups with the aim of rapid scaling, seeking to expand the business quickly to increase the number of users, market share, or production in the short term. Gerlich (2023) investigates short-term strategy orientation in an environment where the annual reward system is a key factor in prioritising short-term strategy orientation. In such an environment, managers, shareholders, and the supervisory board only reward short-term results, leading managers to favour short-term goals. These authors propose a model that can serve as a guideline for any company transitioning from short-term to long-term strategy orientation, as the preferred option. In this context, innovations and technology acquisitions are predominantly a response to the current market situation and less a part of long-term strategic planning.

A Power distance dimension indicates the extent to which members of a society accept the uneven distribution of power and authority in institutions and organisations. Power distance refers to the acceptance of social stratification (Jones & Davis, 2000). In the context of TEO, this dimension plays a vital role in shaping decisions related to new technologies, innovation, knowledge acquisition, as well as a business group performance (Chen, et al., 2022). A high index of Power distance suggests the acceptance of a hierarchical structure, such as centralised decision-making. In societies with a pronounced Power distance, the adoption of new technologies is initiated by top management. Conversely, in societies with a lower Power distance index, the emphasis is on equal opportunities for success, equal access to resources and information, as well as comparable living conditions, regardless of social or professional status. Additionally, organisational structures are decentralised, and decision-making processes occur through horizontal and participatory mechanisms (Hofstede et al., 2010; Hofstede, 2011). In such a cultural context, access to technology and its development require the cooperation of different organisational teams and transparency in communication. Kwon and Kim (2025) emphasise both the theoretical significance and practical relevance of participative decision-making in advancing innovation and organisational adaptability. For practitioners and policymakers, the study highlights the importance of fostering a participatory organisational culture to stimulate employee creativity and encourage voice behaviour. Nevertheless, previous research indicates that lower Power distance boosts innovation rate (Shane, 1993; Rinne, et al., 2012). Therefore, a high index of Power distance enables the rapid introduction of technological changes, requiring defined strategic decision-making. The negative implications of a high index of Power distance are indicated by limited employee creativity, a lower level of cooperation, and the absence of constructive criticism, which can ultimately reduce the innovative and technological capacity in the long term. Similarly, a strong but negative relationship exists between Hofstede's dimensions of Power distance and the Global Innovation Index (GII). Moreover, a Southeast European countries exhibit a high Power distance index (PDI) and a low Individualistic culture index (IDV) according to Country comparison graphs (Hofstede, n.d.-b): Greece (PDI=60, IDV=35), Slovenia (PDI = 71, IDV = 27), Croatia (PDI = 73, IDV = 33), and Serbia (PDI=86, IDV=25).

Uncertainty avoidance reflects the extent to which people feel uncomfortable with ambiguity and uncertainty, and their desire for a predictable environment. Entrepreneurship thrives in regions that prioritise equality and openness to uncertainty (Filippopoulos & Fotopoulos, 2025). Societies with strong uncertainty avoidance prefer a minimum of risk through established systems. These societies exhibit limited tolerance for unconventional ideas or behaviours (Hofstede, 2001). For instance, individuals may experience ambiguity due to mixed or uncertain attitudes towards technology. In these conditions, strategic decisions are long-term and have technical reliability. Innovations are developed in controlled frameworks, often with government support. Entrepreneurs tend to innovate incrementally, relying on already proven technologies. Hooks et al. (2021) found that institutional factors related to technology adoption, namely political stability and absence of terrorism and violence, have a positive impact on Technology adoption rates as well as cybersecurity and competitiveness. The other side of uncertainty dimensions, i.e. cultures with a low index of uncertainty avoidance, have a high tolerance for risk. Technological entrepreneurs in

these societies do not perceive uncertainty as a threat, but as a space for creativity and innovativeness. In these societies, the market approach implies a high degree of autonomy and decentralisation in decision-making (Hofstede, 2001).

"According to Hofstede's theoretical framework, masculine societies are characterised by competition, prestige and material achievements, as well as proactive behaviour and entrepreneurial innovativeness" (Zheng, et al., 2025). In such societies, entrepreneurs foster ventures with the aim of rapid integration into new markets by applying aggressive growth strategies and perceiving a business risk. In contrast, women's societies value interpersonal relationships, community care, and work-life balance. Femininity is a management manner characterised by a low level of conflict (Papula et al., 2018). Also, females, according to higher femininity orientation and independent self-construal indicate a lower growth intention compared to those with lower independent self-construal (Zampetakis, et al., 2016). In women's societies, innovation is not a tool for market competition, but an instrument for sustainable development and improvement of business quality. Understanding these cultural dimensions is key to shaping policies that promote more inclusive and sustainable technological development.

The Indulgence vs. Restraint dimension indicates how culture shapes innovation dynamics and entrepreneurial mindsets. In permissive cultures, entrepreneurs have a greater degree of freedom, self-confidence, and are more risk-averse (Hofstede, 2001). The positive impact of indulgence on firms' risk-taking behaviour is strongest when both unlimited resources are abundant and growth opportunities are large (Alipour & Yaprak, 2022, Matić, et al., 2023). This environment encourages the development of entrepreneurship and the individualisation of technological solutions. When companies face uncertainties and changes in the environment that require adaptation, technological innovation is presented as a decisive factor for differentiation and competitiveness (Fagerberg, 2003). In contrast, in restrained cultures, where norms of self-control, social restrictions, and restraint in the expression of desires are dominant, technological entrepreneurship tends to be more conservative. Lee et al. (2022) found that cultural factors have diminished in their influence on innovation, especially in developing countries, suggesting that cultural development cannot significantly impact the innovation output of developing countries without the construction of the appropriate systems. In such societies, longer-term processes and careful evaluation of technological solutions are encouraged, which can slow down development but contribute to the long-term sustainability of business models. In practice, successful entrepreneurial strategies often require a balance between these two values.

Drawing on the previous premises, the following research hypothesis was formulated: H1 - The explanatory variables representing national culture predict the outcome of the dependent variable TEO, indicating a significant relationship between national culture and TEO.

Furthermore, taking into account earlier research examining the relationship between national culture and TEO, we delved deeper into this issue, making some additional assumptions based on Hofstede's dimensions of national culture.

That is:

H1.1 A significant relationship exists between low Power Distance Index and TEO, as reflected in entrepreneurs' perceptions that the majority of people in their country prefer a more equal standard of living.

Societies with a lower Index of Power Distance emphasise equality regardless of social or economic status; they promote social cohesion and stability, not differences. This hypothesis emphasises the connection between low Index Power distance and TEO.

H1.2 There exists a significant association between Individualistic societies and TEO, based on entrepreneurs' perceptions that initiating a new business represents a desirable career option.

Based on Hofstede's cross-country comparison charts data and previous empirical research, two additional hypotheses are proposed, taking into account the specific context of Southeast Europe (SEE). Following Hofstede's theoretical framework, national culture can be analysed according to low or high power distance, as well as from the perspective of individualism and collectivism, with the potential for positive or negative relationships. By proposing the first additional hypothesis, the research aims to contribute to a deeper understanding of entrepreneurial orientation, filling the theoretical and empirical gap between national culture, i.e. low Power distance and TEO. The second additional hypothesis refers to individualistic societies, taking into account both individualistic

and collectivist aspects of this dimension. The relationship between individualistic and collectivist societies and TEO in the context of SEE remains unclear, with limited research on this topic, although it has significant potential to clarify the business transformation from low-tech to high-tech entrepreneurs.

2. Methodology and research results

The empirical analysis draws on data from the 2018 GEM APS database (Global Entrepreneurship Monitor [GEM], 2018, 2020). Within its framework, GEM assesses entrepreneurial activity through the Total Early-Stage Entrepreneurial Activity (TEA) indicator (GEM, 2018). TEA encompasses: (1) individuals in the pre-operational phase of starting a business, (2) nascent entrepreneurs who have been meeting business obligations and paying salaries for a minimum of three months, and (3) owner-managers who have maintained continuous salary payments for forty-two months (Reynolds, et al., 2004; Wagner, 2004; Stephan, et al., 2015). GEM measures the degree of entrepreneurial activity, aspirations of entrepreneurs, and identifies determinants in order to develop entrepreneurship at the national, regional and global level.

The participants in this research are from the Southeast European countries (Table 1).

Table 1 Research sample

Country	Frequency	Percent	Valid percent	Cumulative percent
Greece	2000	25,0	25,0	25,0
Bulgaria	2000	25,0	25,0	50,0
Croatia	2000	25,0	25,0	75,0
Slovenia	2000	25,0	25,0	100,0
Total	8000	100,0	100,0	

Source: the authors' research based on GEM APS data

For this empirical study, the research sample consisted of entrepreneurs operating in Greece, Bulgaria, Croatia and Slovenia. Two specific criteria were employed in the selection of these four countries. First, they belong to the Southeast European region, and second, similar cultural norms and values characterise the entire example. The research sample comprises 8000 participants, with 50% from countries classified as *efficiency-driven* (Bulgaria, Croatia), and 50% from *innovation-driven* countries (Greece, Slovenia).

The research framework was structured around one dependent variable, TEO: Technology level of the sector, which is one of the GEM Index; it measures the entrepreneurial technology ability/orientation by indicating the level of technology sector by participants between the ages of 18-64. The model additionally included six predictor variables designed to capture participants' attitudes toward national culture. The first variable, Equalinc Qi5, refers to the belief that, in the respondent's country, most people would favour an equal standard of living for all; taking into account Hofstede's theoretical framework, it refers to the power distance dimension. The remaining five predictor variables were as follows: The second variable, Nbgoodc Qi6, represents the proportion of individuals aged 18-64 who perceive starting a new business as a desirable career choice, an indicator linked to individualistic societies within Hofstede's theoretical framework. The third variable, Nbstatus Qi7, measures the percentage of the 18-64 population who believes that successful entrepreneurs enjoy a high level of social status and respect, reflecting the High Status to Successful Entrepreneurs Rate. The fourth variable, Nbmedia Qi8, captures the percentage of respondents who report frequent exposure to media or online stories about successful new businesses, indicating the level of media support. The fifth variable, Easystart Qi9, denotes the share of the population who considers starting a business to be easy, thus serving as an indicator of the general entrepreneurial rate. Finally, the sixth variable, Nbsocent Qi10, reflects the prevalence of businesses primarily aimed at addressing social problems, representing a measure of social entrepreneurship activity.

To test the proposed hypotheses, data analysis was conducted using SPSS software. Multiple linear regression analysis (MLR), a statistical technique that employs multiple explanatory variables to estimate the outcome of a dependent variable, was applied to predict TEO values in the context of early-stage entrepreneurial activity. TEO, as the response variable, based on a range of explanatory variables, tries to demystify the entrepreneurial perception of national culture values, following the explanation of Hofstede's national culture dimensions. In addition, regression

analysis was applied to determine which variables function as stronger predictors compared to others.

All variable sets were incorporated into a linear regression model using the enter method. Before analysis, the assumptions of MLR and multicollinearity were examined. The findings revealed no substantial correlations, and the correlation matrix presented in Table 2 confirms the absence of multicollinearity among the variables.

Table 2 Correlation Matrix

Variable	1	2	3	4	5	6	7
TEO	1						
Qi5	,084	1					
Qi6	-,188	,069	1				
Qi7	-,005	-,042	,064	1			
Qi8	,011	,108	,031	,177	1		
Qi9	-061	,107	,034	,008	,162	1	
Qi10	-,005	,149	,081	-,008	,085	,111	1

Source: the authors' research based on GEM APS data

Table 3 provides an overview of the MLR model alongside the overall fit statistics. The model yielded a correlation coefficient of R = 0.222 and a coefficient of determination R^2 = 0.049, reflecting a relatively low explanatory power. This outcome may imply one of two scenarios: firstly, the presence of participant subgroups exhibiting larger effect sizes contrasted with others displaying smaller effects; secondly, depending on the research domain, a low R^2 value can still hold scientific and theoretical relevance, as small yet reliable coefficients have been acknowledged in prior studies (Vacha-Haase & Thompson, 2004; Lecuna, Cohen & Chavez, 2017, p. 153). Additionally, the Durbin-Watson statistic resulted in a value of d = 2.104, which falls within the acceptable range of 1.5 to 2.5. This indicates the absence of first-order linear autocorrelation in the dataset, thereby satisfying a key assumption for proceeding with further model analysis.

Table 3 Model Summary

Model	R	R Square	2Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,222	0,049	0,037	0,427	2,104

Source: the authors' research based on GEM APS data

In the context of Table 4, the Analysis of Variance (ANOVA) demonstrates the results of the F-test. The F-test in linear regression operates under the null hypothesis, which posits that the model does not account for any variance in the response variable. The findings reveal a statistically significant F-test, suggesting that the model does explain a portion of the variance in TEO. Specifically, the results are reported as F (6, 453) = 3.914, with a p-value less than 0.05. Consequently, the ANOVA results indicate that the overall model offers a statistically significant fit to the observed data.

Table 4 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4,283	6	0,714	3,914	0,001[b]
	Residual	82,611	453	0,182		
	Total	86,893	459			

Source: the authors' research based on GEM APS data

According to the information presented in Table 5, several key observations can be made regarding the data. Firstly, the Variance Inflation Factor (VIF) values for all examined variables are below the threshold of 10, with the highest value recorded at 1.075. This indicates a low potential for multicollinearity among the variables. Secondly, the Tolerance values for each variable exceed the minimum acceptable level of 0.10. Collectively, these findings suggest that multicollinearity is absent among the explanatory variables, thereby validating the integrity of the regression analysis.

Table 5 Coefficients

Model		Unstandardized Coefficients		Stand. Coeff.	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Const.)1	0,158	0,054		2,913	0,004	0,051	0,264		
	Qi5	0,101	0,046	0,104	2,210	0,028	0,011	0,191	0,956	1,046
	Qi6	-0,176	0,042	-0,194	-4,196	0,000	-0,258	-0,093	0,985	1,015
	Qi7	0,009	0,041	0,010	0,213	0,831	-0,072	0,090	0,960	1,041
	Qi8	0,013	0,042	0,015	0,315	0,753	-0,070	0,096	0,930	1,075
	Qi9	-0,068	0,047	-0,068	-1,448	0,148	-0,160	0,024	0,958	1,044
	Qi10	0,001	0,044	0,001	0,032	0,975	-0,085	0,088	0,961	1,041

Source: the authors' research based on GEM APS data

The results presented in the above table indicate that the explanatory variables Qi5 and Qi6 are statistically significant at the $p < 0.05$ level and serve as more influential predictors relative to the other variables. Specifically, Qi5, which represents Power Distance, shows a positive beta coefficient ($b = 0.101$, $p < 0.05$), whereas Qi6, denoting Individualistic societies, exhibits a negative beta coefficient ($b = -0.176$, $p < 0.05$). An increase in the Qi5 variable is associated with a corresponding increase in the level of TEO, while an increase in Qi6 corresponds to a decrease in TEO. Holding all other predictors constant, a 1% increase in the Power Distance measure is estimated to result in approximately a 10% increase in TEO. Conversely, a 1% increase in the Individualism measure predicts approximately a 17% decrease in TEO. The other variables related to entrepreneurial perceptions of national culture-Qi7, Qi8, Qi9, and Qi10-did not reach statistical significance and exhibited only minimal associations, although they contribute to the predictive model to a limited extent.

The regression equation derived from this model can be formulated as follows:

$$TEO=0.158+0.101Qi5-0.176Qi6+0.009Qi7+0.013Qi8-0.068Qi9+0.001Qi10$$

The equation offers a quantitative formulation that characterises the relationship between national culture and TEO, with each coefficient representing the expected change in the value of TEO, resulting from a one-unit change in the corresponding cultural dimension, assuming all other variables remain constant.

3. Discussion

Consistent with our hypotheses, the findings from the multiple linear regression analysis demonstrate a significant link between the national culture explanatory variables and the dependent variable TEO. This finding is consistent with previous research supporting this construct (House, et al., 2004; Hornik & Tupciu, 2006; Cardon, 2008; Abbasi et al., 2015). The adjusted coefficient of determination indicates that the explanatory variables explain 4.9% of the variance in TEO. While the relationship may be considered weak, we have obtained valuable insights from the data, as some datasets exhibit a notable amount of unexpected variation.

Accordingly, the results support the acceptance of hypothesis H1. Moreover, the study extended this investigation by positing a significant relationship between lower Power Distance and TEO. The findings offer statistically significant and positive evidence in favour of hypothesis H1.1. These outcomes align with Hofstede's (2001) theoretical framework, which posits that lower Power Distance is conducive to both technological advancement and adoption. However, in societies with a low power distance index, organisational structures have a higher degree of decentralisation and horizontally established communication, which allows for greater participation of employees in strategic and operational processes. Uniform access to information removes hierarchical barriers in the flow of information. In such conditions, the implementation of new technologies is more efficient, and entrepreneurs react promptly and make optimal decisions. In this context, the TEO does not depend solely on the availability of technical and financial resources, but also on the cultural context that encourages cooperation, open communication and trust between different levels of management. In such a culture, employees test new ideas and drive innovations without fear of failure. Low index power distance implies an environment in which the organisational culture is adapted to dynamic technological development, and entrepreneurs feel that they can integrate new technologies into their business models.

Furthermore, we assumed a significant

relationship between Individualistic societies and TEO, which aligns with previous research (Abbasi et al., 2015; Hornik & Tupciu, 2006). Research results suggest a statistically significant but negative confirmation of H1.2. Entrepreneurs' perception that starting a business is a desirable choice may lead to entrepreneurship in less-developed technology sectors, due to a combination of subjective perceptions, limited resources, and lower entry barriers in those sectors. Specifically, when entrepreneurs view entrepreneurship as a desirable and achievable path, they are more inclined to start a business even under conditions of limited technological competence or lack of access to highly developed markets. Low-tech sectors often require less initial capital, less specialised knowledge, and allow for quicker implementation of business ideas, making them more appealing to entrepreneurs who are motivated yet insufficiently technically equipped or connected to innovation ecosystems. Moreover, in economies with limited institutional support for high-tech entrepreneurship, operating in low-tech sectors presents a more favourable option for entrepreneurs and further encourages them to focus on these areas. Low-tech sectors, such as trade, catering, or simple service activities, feature a lower level of technical complexity and clearer management models. This facilitates faster realisation of a business idea without the need for innovation or extensive product development, and entrepreneurs tend to utilise older technological solutions that are not competitive enough for the high-tech sector. In this context, a positive perception of starting a business does not necessarily reflect a strong orientation towards technology and innovation, but rather conveys optimism and confidence regarding success in a predictable environment. These research results indicate that technology-based entrepreneurs in the TEA stage from Southeastern Europe may be more suited to a collectivist culture that values cooperation, stability, and interdependence, which could potentially provide a more suitable environment for starting ventures requiring a higher level of innovation and technological readiness.

Furthermore, countries in Europe that have a lower Power distance index and a high index Individualism culture index, are: Austria (PDI = 11, IDV = 55), Denmark (PDI = 18, IDV = 74), the Netherlands (PDI = 38, IDV = 80), Sweden (PDI = 31, IDV = 71), Norway (PDI = 31, IDV = 69), and Great Britain (PDI = 35, IDV = 89) (Hofstede, n.d.-b). These cultural values suggest that decisions in these societies are made collaboratively, with an emphasis on personal freedom, initiative, and responsibility. Such cultural environments are particularly conducive to fostering entrepreneurial activity and encouraging technological innovation, as they facilitate more flexible organisational structures and openness to new technologies. Such cultural contexts are particularly favourable to the development of entrepreneurial activity and TEO, because they support more flexible organisational structures and openness to the adoption of new technologies.

Conclusion

The purpose of this paper was to explore the effect of national culture on TEO by identifying key determinants of national culture that contribute to this formation, utilising Hofstede's theoretical framework.

The practical implications of this paper relate to the ability of technology-based entrepreneurs in the early stage of entrepreneurial activity to align their business performances with prevailing cultural norms and values while responding to the demands imposed by the globalised market, including the improvement of TEO.

First and foremost, the findings of the present study indicate that TEO is a complex phenomenon influenced by numerous factors. We discovered that technology-based entrepreneurs from SEE, with a strong technology orientation, favour an environment characterised by a low Index of Power distance while conducting their business in high-tech sectors. Although these findings are not uncommon, it is apparent that high Power distance prevails in the SEE region, as illustrated by the Country comparison graphs. This suggests that the opposing sides of the Power distance dimension-namely, low and high-are intertwined, which is not unusual while these countries are classified as partially efficiency-driven (e.g., Bulgaria, Croatia, Serbia, Macedonia). In these nations, entrepreneurs with a more innovative structure, i.e., those possessing a higher degree of technological orientation, drive technological prosperity, in contrast to traditionalists who prefer a well-established system and operate in familiar sectors where low technology is predominant. This cultural context fosters the development of new entrepreneurial ventures, including technological ones. These findings entail several implications for technology-based entrepreneurs: 1) Entrepreneurs functioning in societies with a low index of Power

distance should fully leverage the advantages of decentralised decision-making as a strategic asset in high-tech sectors. Such an environment enables them to build teams based on knowledge rather than formal hierarchy. They should promote open communication, involve all team members in the decision-making process, and cultivate a culture where feedback is encouraged. 2) Additionally, they should capitalise on the easy access to support networks, such as incubators and accelerators. By employing agile work methodologies, entrepreneurs can ensure quicker adaptability to the market and enhanced competitiveness. In summary, technology-based entrepreneurs should be grounded in the principles of openness and participatory decision-making, as these elements constitute the foundation for successful business in high-tech sectors.

But for the conclusion to be complete, other dimensions related to TEO must also be taken into account. Our findings show that if entrepreneurs perceive the environment as Individualistic, that leads more likely to operating in low-tech sectors. This is not an unusual finding, as entrepreneurs, although having greater freedom in decision-making and being able to develop their ideas more freely than in collectivist cultures, still choose to operate in well-known low-tech sectors. A few studies indicate that the fear of failure is still present in SEE, due to social context and historical heritage, which may cause this individual behaviour. Entrepreneurs who perceive society as individualistic and operate in low-tech sectors, and who aspire to move into high-tech sectors, should adopt a proactive approach, by investing in knowledge, technological modernisation and establishing cooperation with stakeholders. Although individualistic values encourage independence and personal initiative, success in high-tech industries also requires the development of social networks and partnerships with research centres and technology firms. Entrepreneurs must be flexible, risk-averse and continuously innovate. In this context, although the government has a significant role in creating an enabling environment through various benefits and infrastructure that support research and development, the key shift must come from the entrepreneurial sector itself, through strategic transformation and the adoption of a business model that supports TEO.

In the context of Serbia, the practical implications underscore the importance of formulating targeted programs and initiatives aimed at facilitating the transition of entrepreneurs from low-technology sectors to high-technology industries. Education systems should establish a robust knowledge base that fosters the development of technology entrepreneurship, particularly in environments characterised by low power distance and a negative association between individualism and TEO. Enhancing connections with startup incubators and technology parks will foster entrepreneurs' proactive access to innovations and technologies aligned with the business models of global high-tech ecosystems.

The theoretical implications of this study lie in its contribution to the field of cross-cultural management as well as technology entrepreneurship by examining the relationship between national culture and TEO during the early stages of entrepreneurial activity, utilizing Hofstede's national culture dimensions as a theoretical framework. The study contributes to an understanding of the role of cultural values in shaping technology and innovation adoption, sectoral-technological mobility and entrepreneurial decision-making. Additionally, the study seeks to fill a gap in existing literature regarding the link between national culture and TEO.

A limitation of this study is that the empirical findings are generalizable solely to entrepreneurs within the four countries of the Southeastern European (SEE) region. We investigated only one set of drivers of TEO. Besides these factors, it would be valuable to expand the scope to include capabilities such as individual knowledge, skills, experience, fear of failure, or socio-demographic factors, which may also influence TEO.

Declarations

Availability of data and materials

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