



The Impact of Information and Communications Technology on Entrepreneurial Orientation in North Cyprus

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Abstract

This study examines the influence of information and communication technology (ICT) on the di-mensions of entrepreneurial orientation (EO), specifically innovativeness, risk-taking, and proac-tiveness. The investigation was motivated by evidence from developed economies indicating a pos-itive association between ICT adoption and entrepreneurial orientation. Drawing on Cartesian and contingency theory perspectives, three regression-based models were formulated to assess the pro-posed relationships. Data were collected through structured questionnaires distributed both online and in person to international student entrepreneurs. A total of 146 valid responses were obtained and analyzed using simple regression techniques. The findings reveal that ICT has a positive, statis-tically significant effect on all three EO dimensions: risk-taking, proactiveness, and innovativeness. By simultaneously testing three distinct models, this study offers a structured analytical approach that has not previously been

applied to these relationships. The empirical results provide a foundation for recommendations regarding the strategic role of ICT in fostering entrepreneurial orientation.

Keywords: Risk-Taking, Innovativeness, Proactiveness, E.O, ICT

Introduction

Over the past 50 years, ICT has grown and developed; without the use of that technology, you can't think and plan a project, company, or any other initiative. If we are talking about information technology, which means not just personal computers or smart telephones, but also modern machinery in factories, the car industry, aviation, various household appliances, etc., that has made our daily lives more convenient and has reduced costs and time as a whole. Entrepreneurship is extensively studied in organizations and their relationship with technology and innovation (Bosma et al., 2007; De Villiers & Foba, 2007). The incorporation of technology and innovation with the performance of the company has lately been proposed (Bhuan et al., 2005). Investments in non-continuous innovation and technological distortions are being made to achieve advancements and innovations in information and communication systems, with the assumption of an advent of completely new markets (Schindehutte et al., 2008). In developing markets, in which development is frequently a key objective of companies (Antoncicm & Hisrich, 2001), corporate innovation can be important to profits and sustainability.

The 21st century is turning towards a technology and knowledge-driven economy in which entrepreneurs must recognize and anticipate technological opportunities in order to join future business leaders (Kourilsky & Walstad, 2002). ICTs and corporate innovation can not only generate value in the system of global growth undertaken by several developing markets. Enterprises in developing economies can benefit from strong technology and a solid business focus to compete on a global level (Rwigema et al., 2008). Besides the quest for strategic innovation by McGuigan and Henderson (2005), earlier literature and empirical findings suggest that entrepreneurial orientation is an essential part of organizational and economic advancement. Entrepreneurship inside organizations is essential in terms of strategic innovation, especially under changing environmental conditions (Knight & McCabe, 1997). The EO construct is outstanding not only for big businesses but also in different stages of economic development and in diverse cultural contexts, also for small and medium-sized organizations. At the organizational level, entrepreneurship can guide the entire business, act as an essential part of the strategy of an organization, and may act as a key corporate strategic component (Morris et al., 2008). Business action is the basis of business processes and behavior. The study focuses on the two dominant guidelines, ICT and EO, often referred to as strategic guidelines at the company level. As these guidelines may be critical for a company's long-term survival (Stevenson et al., 1983), the empirical study of these guidelines may be facilitated. This paper moves in this direction by testing the connection between EO and ICT

empirically. The direct EO-ICT relationship can, however, simply be considered as incomplete; how environmental considerations are linked to each guidance must be understood (Wang, 2008). Research suggests that the interaction between this strategy and the external environment of a company is a key part of ICT (Zahra et al., 1999). Despite the strong empirical evidence and the observation that the ICT and EO are the strategic imperatives, there are dangers in Africa and most developing countries' companies to fall behind, and subsequent study of this nature helps to understand these imperatives (Antonicic, 2017). Another reason to focus on EO is that while the EO-scale study has been replicated on numerous occasions, a majority of entrepreneurial and technology research is carried out in the US. As recognition of the relevance of international business enterprises is given, the further study of EO and of ICT in the context of emerging economies seems justifiable (Jantunen et al., 2005).

Literature Review

Entrepreneurial-orientation as a strategy used by an organization that captures the organization's strategic practices, management viewpoints, and business behavior (Mintzberg, 1973). The orientation of entrepreneurship is claimed as the foundation for decisions and entrepreneurial conduct planning and execution (Rauch et al., 2009). EO is used to develop the ability to compete successfully, nurture your vision, and to achieve the organization's goal. Nevertheless, some research has shown that EO does not improve the performance of all companies. Instead, EO may not be seen as a simple, performance-enhancing attribute, but instead to improve when used in the correct company circumstances. If the situation of the company doesn't correspond to the use of the EO, EO may even be uncomfortable for businesses in some cases. The company's environment (structure, strategy...) can be different situations in or in the company (Linton, 2016) (also known as context). Bourgeois (1980) distinguished himself correctly on the way managers conduct themselves as entrepreneurs, which includes the courage to exploit new markets, attempt to create new things, and risk opening. However, the Lumpkin and Dess (1996) organization, which is an innovative organization, risk-taking and proactive in the running of its competitors, should participate in entrepreneurial activity within the organization. The entrepreneurship of organizations is related to entrepreneurship (Covin & Lumpkin, 2011). Entrepreneurial orientation review indicates that Miller's (1983) view of EO has been taken as a combination of innovation, proactivity, and risk-taking in the majority of previous studies. Enterprise orientation has three dimensions: proactivity, taking risks, and innovation. Jafarzadeh et al., (2026) presents a combined application of data envelopment analysis and the Malmquist productivity index and evaluates the financial performance of selected companies.

Proactiveness

This is a company's capability to lead market leadership that is positive, advanced phases, and policies in regard to marketing, the development of a new-product, services, processes, and technology to rise above its competitors. It is vital for a proactive company to take the lead in introducing a product and services that are new and to achieve the competitive edge of the industry so that it is able to compete successfully with others (Zhao et al., 2013). Proactivity takes on an important role. Persistent steps are taken by companies to identify and maximize their chances and to bring new ideas.

Risk-Taking

The market and technology definition for the company process to be highly rewarded with courageous action is called taking risks. According to Lyon et al. (2000), risk-taking shows the procedure and speed of an undertaking in terms of market activity to take on the difficulties of entering a new market. This suggests that businesses also behave pessimistically in the sense of strategic risk-taking while the direction of a business is not established, conduct analysis, seek potential ways to build a strategic advantage, and take advantage of creative benefits. As regards technology, a company's response is demonstrated by its willingness to invest in resources with the objective of innovating technology projects with an increase in uncertainty and risk that are firmly linked to the entrepreneur's risk priority (Wiklund, 2003). Improving the competition by establishing new rules that promote innovation and adventure is essential (Christensen, 1994). It is important to achieve success. A business creates an environmental danger and acceptance with the aid of risk-taking in order to adopt new technology and improve innovation performance.

Innovativeness

It indicates that recognizing and incorporating new prospects and perspectives—manifested in the form of products, services, and procedures—is a major dimension of entrepreneurial orientation. Innovation. Unless organizational innovation (Covin & Slevin, 1991), entrepreneurship can no longer exist. Such scholars agree that strategic behavior represents the manner in which the business's advances are driven by innovative theories, discoveries, tests, and the production of procedures and goods. In the business process, innovation must have a strategic model (Friesen, 1982). The first model relates to organizations that are high-risk-taking and constantly innovating, but the second model encourages innovation to rely on a strong and effective market. The authors mentioned stressed that since the expected return can be achieved, innovation is risky.

Information and Communications Technology (ICT) and Innovation

In entrepreneurial businesses, ICT and innovation are best understood in several contexts. It defines how earlier time entrepreneurs and established business owners invest in new (or unresolved) products or services that are linked to existing customer experiences (Van Hooren et al., 2007) or in the stages of innovation in companies, assessed by their level of expertise and whether or not the company is in a strong position. Several types, not only reactive imitating and proactive localization, substitution for imports, creative imitating, early-creation entry, global niche, and global innovation, are proposed in the literature (Park & Bae, 2014). The strategic choice concerns technology-based companies in particular. For example, they may adopt a product market strategy for sales growth or a strategy aimed at increasing the technology's value in a bid to eventually exit the sale to their strategic partners. A company with strategic distinction premised on innovative new product emergence can benefit from the advancement of human resources via years of professional experience in technical jobs. Such experience would provide insights into technological developments that could improve product characteristics (Shrader & Siegel, 2007). The development of new product technology and a commitment to technical expertise show the importance of selecting strategies that can be implemented successfully for new technological enterprises. In addition, genuine steps of success for technological entrepreneurs were recommended in the sense that they were able to create and market fundamentally new and innovative products or services. Progressive innovation is crucial not only because the potential benefits are generated, but also because it fundamentally changes consumer behavior.

According to Sarasvathy et al. (2003), evaluating the regional transformation in technology entrepreneurship involves analyzing how new engineering ideas are incubated in modern economics, universities, and research and development laboratories; the Boston and Silicon Valley regions have not accidentally generated significant wealth. The impulse to encourage technopreneurship in organizations has been the introduction of the entrepreneurial mind into technological endeavors and the promotion of inventive skills. Comparable attributes occur, such as commitment, readiness to take risks, ability to mobilize funds, and sustainability to resolve reversals for entrepreneurs and technopreneurs. But technopreneurial expertise in appropriate technological developments and innovative expertise must be combined (Wong et al., 2005). This is true of the developments in technology. It is the unique understanding of an individual that appears as being the most important element in the discovery and use of rich ideas (Fiet et al., 2002). Technopreneurial companies are an important group that can make a considerable contribution to increasing national competitiveness, productivity, and efficiency. Technopreneurs also participate through a global network of partners in go-to-market programs (Wire, 2005). The formal strategic process can integrate technopreneurs into companies. Foo and Foo (2000) design a company model in Singapore that helps shape a unique environment suitable for technopreneurs who flood. In Singapore, the government created technology parks and research centers to

encourage more companies involved in research and development; in order to promote research in technology-related industries among technopreneurs, the government has allocated billions of US dollars in research funds and risk capital. Integration of enterprise with strategy (e.g., TE) depends on critical aspects of business strategy and entrepreneurship strategy (Morris et al., 2008). In many situations, it is conceivable that a company should excel in all or most of the dimensions of ICT in order to achieve a superior ICT value. This indicates that the links between EO and ICT are important.

The Contingency Approach

In EO, the main idea behind the contingency theory is that the business must be aligned to the best results in the context (Wiklund & Shepherd, 2005). Lumpkin and Dess (1996) have suggested that EO should be aligned with a wide range of different contexts and that these may be divided between external and internal environmental factors. Structure, strategy, processes, and resources, for example, can be organizational factors, while environmental factors can be market, industry, and environmental factors. Alignment between the enterprise and context leads to increased organizational performance. The concept is a simple one. But it seems that contingency fit has been conceptualized in several different ways when reading the EO literature.

Cartesian Approach

A couple of researchers are taking what might be called a Cartesian approach (Gerdin & Greve, 2004; Covin et al., 2006). This approach takes a standpoint of the company in which a set of variables is usually focused on (Meyer et al., 1993). For example, Moreno and Casillas (2008) examine how EO can relate to performance in the context of the company's operation. Similarly, Wales (2015) examines EO-performance relationships in accordance with the context of the various network capabilities of the company. They propose that companies that increase their network capacity also increase EO's contribution to corporate performance. These are typical EO studies from a Cartesian point of view. The Cartesian fit contingency stream considers enterprises to adapt their structure to various contingencies over time and constantly. Because researchers generally concentrate on two independent variables in this regard, this specific relationship with high specificity can be accurately explained and explained (Drazin & Van de Ven, 1985). These relationships can be linear or curvilinear between a structural variable and the contingency factor (Donaldson, 2001). This relationship is expected to be bivariate. The Cartesian stream considers that a continuum of variables and contexts is in many respects. Thus, a structural variable can match the Cartesian view for each level of the contextual variable.

There are several literary studies that have examined critically the relationship between entrepreneurship and ICT worldwide. The focus of this study is on two dominant guidelines, ICT and EO, often known as strategic guidelines at the company level. Since such guidelines

may play a critical role in the company's long-term survival (Stevenson et al., 1983), an empirical study of them must be facilitated. In this sense, this paper tests the relationship between EO and ICT empirically. Ahmad (2019), the mediating role of innovation capability on ICT support, entrepreneurial orientation support, and SME performances. The study revealed the literature review of the determinant dimensions, which include ICT support and entrepreneurial orientation support towards innovation capability as a mediating role, which influence SMES performances. The contribution of this paper is in merging those constructs into a comprehensive conceptual framework model to enable better understanding and clarity about how the efforts should be made to boost SMES growth and development. However, simply looking into the direct EO-ICT relationship can be an incomplete picture; how environmental factors could be linked to each orientation is to be understood (Fan et al., 2008). Research suggests that the interplay of this strategy with the external environment of the company is a key part of ICT (Zahra et al., 1999).

In addition, EO is affected by the specific environment of the company and should fit in. This study, therefore, presumes that there are connections between EO and ICT, environmental hostility, and dynamism. In a study, Malek et al. (2017) found that people were given direct access to ITC and organizational staff knowledge of the needs and behavior of the markets and customers, with important correlations, and that ICTs were highly capable of developing different factors influencing the growth of organizational business (Malek Mohammadi et al., 2009). Idrus et al. (2020) examined the effect of entrepreneurial orientation and technology orientation on market orientation with education as a moderating variable. Referring to the assumption of the research approach, the study uses a quantitative approach, and the causal relationship across variables is examined with SEM-PLS. The object of research includes Small-and-Medium Enterprises in East Java, Indonesia. The sampling method is simple random sampling with the Malhotra technique. After applying it to the research population, the obtained sample is 150 Small-and-Medium Enterprises.

Data are collected with a questionnaire. Responses are analyzed using statistic program of Smart-PLS version 3.2.7. Some empirical findings are obtained: (1) The increase of entrepreneurial orientation and technology orientation goes along with the increase of market orientation; (2) Education strengthens the impact of entrepreneurial orientation on market orientation; and (3) Education can reduce the influence of technology orientation on market orientation. In a study, Rasouli Nejad and Noory (2009) found that the use of information technology and communication and training for employment skills creation are positive and significant. There was a good relationship. In a research project, Litao et al. (2012) found that there was an important positive connection between regular ICT activities, speeding up business, economic growth, job creation, and improving the creation of jobs.

Kollmann & Christofor (2014) investigated the International entrepreneurship in the network economy. The study analyzed the conditions of the initial internationalization

decision in the network economy. Based on the information systems, international entrepreneurship, and entrepreneurship literature, factors that constitute the internationalization propensity are elicited. The results of this study suggest that a holistic perspective, including the founder, business model, and the firm, should be considered when explaining the internationalization propensity of entrepreneurs. Findings from this study revealed that depending on the entrepreneurs' entrepreneurial orientation, the internationalization propensity varies. Data were obtained by conjoint analysis experiments conducted with German network economy entrepreneurs. In a research study, Heyshong (2004) found that the rate of use of information and communication technology and the improvement of education performance to enhance agricultural products are significantly and positively connected. Hindle and Klyver (2007) found that the rate of media use, such as television, the internet and the establishment of jobs and businesses for young people, is a positive and significant relationship. In their study, Theodoros et al. (2008) found that the use of ICT in entrepreneurship co-operation was significant and positive in order to improve the process for product sales.

Hartono and Herman (2019) investigated the competitiveness of ICT Adoption and Entrepreneurship Orientation on SMEs in Indonesia. The method used is a quantitative method by data collection using questionnaire distribution to several SMEs from various business sectors. Data processes using multiple regression analysis were performed using SPSS version 2. Data collected using a questionnaire distributed to SME owners who have adopted ICT, and the size of samples determined. The result of research stated that SME facing difficulties in adopting ICT and are more concerned to the sales quantities instead of product quality or market penetration, and also require capital loan assistance to develop their businesses. Even though E.O and ICT are the strategic paradigms for beneficial empirical findings and observations, there has been a risk that companies in Africa may lag, and a study of this type would then contribute to an understanding of these considerations (Antoncic, 2017; Bosma et al., 2007; Goel, Gonzalez-Morano, & Saez-Martines, 2003). Another possible explanation for EO would be that the bulk of entrepreneurial and technological studies in the USA was carried out while EO studies were frequently repeated. Given the importance of global enterprise (Jantunen et al., 2005), further, EO-ICT research seems entirely justified in an emerging country.

Research Problem

Innovate or die. In fact, business organizations have intensified their search for a strategy that gives them a competitive advantage over the last decade, when globalization transformed the competitive environment. ICT was identified as an important tool for influencing entrepreneurship. The Turkish Republic of Northern Cyprus is located on a small, politically divided island and hosts a large population of international students from around the world. The impact of ICT in no country can be neglected, as it positively affects daily business, but

many International students in TRNC do not accept this view, as they view the country as a place where entrepreneurs do not encourage them.

Research Aim and Research Questions

In order to understand the impact that ICT has on TRNC's business guidance, the research adopts semi-structured questions to obtain information from respondents. From a theoretical point of view, research seeks to develop a framework that best captures the interplay of ICT and entrepreneurial orientation.

What influence does ICT have on Innovativeness among international student entrepreneurs in the TRNC?

- What influence does ICT have on Proactiveness among international student entrepreneurs in the TRNC?
- What influence does ICT have on Risk-Taking among international student entrepreneurs in the TRNC?
- What influence does ICT have on innovativeness among international student entrepreneurs in the TRNC?

Research Hypotheses

For effective guidance in this research, the following hypotheses were formulated.

First Hypothesis

Ho: ICT does not have an effect on Proactiveness among international students who are entrepreneurs in the TRNC.

Ha: ICT has an effect on Proactiveness among international students who are entrepreneurs in the TRNC.

Second Hypothesis

Ho: ICT does not have an effect on Innovativeness among international students who are entrepreneurs in the TRNC.

Ha: ICT has an effect on Innovativeness among international students who are entrepreneurs in TRNC.

Third Hypothesis

Ho: ICT does not have an effect on risk-taking among international students who are entrepreneurs in the TRNC.

Ha: ICT has an effect on risk-taking among international students who are entrepreneurs in TRNC.

Methodology

Creswell (2014) reports that the research design consists of a collection and analysis of techniques and guidelines that are used to analyze variable measurements indicated by the research problem. Design studies define the study type and type (descriptive-longitudinal case studies), research problem, study hypotheses, endogenous and exogenous variables, and experimental design, as well as data-collection techniques, as applicable, and an analytical statistical plan. Indeed, the research design is a template to solve survey issues. Survey technique is also one of the main data sources used for collecting quantitative information on objects in a population in this study. This academic investigation also employed the quantitative method, which is a technical scientific inference for the collection of non-real data (Maxfield & Babbie, 2014). Such research concerns interpretations, meanings of concepts, characteristics, metaphors, symbols, descriptions of objects, and does not refer to 'counting or measures' of these concepts, which respond to when and how a phenomenon is produced (Munir et al., 2012).

Research Model

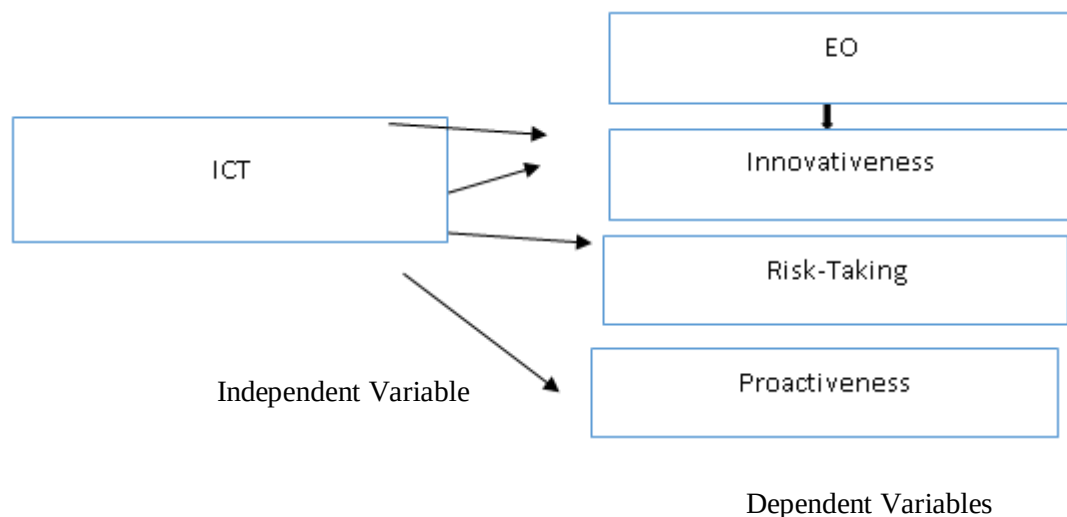


Figure 1. Research Model

Measuring Instruments

The EO and ICT measures have been based on instruments already established. The dimensions of EO have evolved from entrescale, in which the innovative and proactive position of managers in companies has been identified. This scale was initially developed at

the level of Khandwalla (1977) and refined at the cross-cultural levels by Miller and Friesen (1983) and Covin and Slevin (1989). Though there are options E.O. ideas (Brown et al., 2001) and Davidsson (2004), it demonstrates the established EO gauge, which has a benefit in earlier studies, has theoretical backing, a multidimensional structure, and relationships that are theoretically essential, and allows for the development of a good understanding. The EO is then assessed in a five-point scale of bipolar Likert that represents three dimensions of E.O, such as innovativeness, proactiveness and risk-taking. Furthermore, a combined EO measure can be beneficial when a distinct relationship between three dimensions and other factors (Kreiser et al., 2002) is not anticipated, as was the situation in this research. Several different technological dimensions, generally considered to be more important in terms of the technology strategy of an organization, have been applied to operationalize ICT. A core set of technological and competitive questions from the Entrepreneurial Dynamics (PSED) Panel Survey (Gartner et al., 2004) was chosen to allow meaningful comparisons with previous works.

Results

The quantitative method is used in this research. Tables, diagrams, and figures are used to indicate occurrence rates by creating an association of statistical variables to complex statistical modeling, and to make statistics such as indices for comparison. Applications are provided. After data collection, I used SPSS for analysis in the economy, business, finance, and management as statistical software. The data were subsequently transformed into tables and percentages to facilitate interpretation. The people were given a percentage interpretation of the opinion on the questionnaire. In addition, data were analyzed to show the distribution of views of different respondents for the different research questions. Ultimately, it has been utilized to analyze the interaction between dependent and repressors using basic linear regression.

Correlation

In the broadest sense, correlation is any statistical association, though it commonly refers to the degree to which a pair of variables is linearly related. The above correlation table can be interpreted as follows: from 0 - 0.2, between 0.2 and 0.5, between 0.5 and 0.7, between 0.7 and 0.9, and above 0.9 illustrate very weak correlation, weak correlation, moderate correlation, high correlation, and very high correlation, respectively.

Table 1. Pearson Correlation

		ICT	INO	PR	RK
ICT	Pearson Correlation	1	0.788**	0.826**	0.369**
	Sig. (2-tailed)		0.000	.000	.000
	N	146	146	146	146
INO	Pearson Correlation	0.788**	1	.675**	0.479**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	146	146	146	146
PR	Pearson Correlation	0.826**	.675**	1	0.333**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	146	146	146	146
RK	Pearson Correlation	0.369**	.479**	0.333**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	146	146	146	146

** . Correlation is significant at the 0.01 level (2-tailed).

ANOVA (Analysis of Variance)

Analysis of Variance (ANOVA) is a series of mathematical models utilized to examine the disparities between the group averages in a survey and related evaluation processes (e.g., "variation" among and between groups). ANOVA offers a statistical test in its simplest terms to establish whether all the populations mean of various groups are equivalent and thus generalizes the t-test to more than two groups. For statistical purposes, ANOVA helps equate (test) three or more groups. It is comparable narratively to multiple two-sample t-tests, but it is more prudent, leading to fewer errors of type and thus suitable for a broad range of practical issues.

Table 2 illustrates the ANOVA test performed for the three frameworks. For both of the aforementioned models, all the analyzed results are scientifically valid as seen by the prob (0.000). It suggests that the results utilized in this study were sufficient to derive a final result on the estimation of the demographic variables, as shown by the p-value (0.000), <1% of the significant point in the first experiment, with the accompanying F-stat of 1339. The second model, the p-value is 0.000, which is less than 1% significant level in the first model with a corresponding F-stat of 303, and in the third model, the p-value is 0.000, which is accompanied by f-stat of 1111.57. Therefore, all these models are significant.

Table 2. ANOVA table for the 3 models

	Model 1		Model 2		Model 3	
	SS	Df	S.S	df	S.S	df
Regression	2929.54	1	1590.84	1	2074.44	1
1 Residual	312.70	143	750.46	143	266.86	143
Total	3242.24	144	2341.31	144	2341.31	144
F-stat	1339.701		303.13		1111.5	
Sig	0.0000		0.0000		0.000	

Model Summary

The table below illustrates the summary of the model used in this analysis. Three models were utilized, and their summary is depicted below. The frameworks are good since their R^2 is 0.90, and adj R^2 is 0.90, which implies that 90.3% of the variation in the endogenous variable is explained by the regressors. The DW is 1.98, which indicates that serial correlation does not surface in the model. In the second model, R^2 is 0.67, and adj R^2 is 0.67, which implies that 67% of the regressor can define the variation endogenous, and the remaining 33% can be attributed to the error term. Furthermore, the DW is 2.05, which indicates that serial correlation does not surface in the model. Finally, in the last model, R^2 is 0.88, and adj R^2 is 0.88, which implies that 88% of the regressor can define the variation endogenous, and the remaining 12% can be attributed to the error term.

Table 3. Summary of the model analysis

	Model 1		Model 2		Model 3	
	SS	Df	S.S	df	S.S	df
Regression	2929.54	1	1590.84	1	2074.44	1
1 Residual	312.70	143	750.46	143	266.86	143
Total	3242.24	144	2341.31	144	2341.31	144
F-stat	1339.701		303.13		1111.5	
Sig	0.0000		0.0000		0.000	

Discussion

This sub-section of the chapter elaborates on the findings discussion. The first analysis carried out is the reliability test using the cronbach alpha. Based on the reliability test, all the variables utilized are internally consistent since they are more than the 0.70 benchmark. Furthermore, the descriptive statistics mirror the respondent's personal information. The next analysis is the model summary. Based on the three models' summary, the R^2 s are 0.90, 0.67, and 0.88, respectively, which demonstrates that the exogenous variables can explain significant variation in the repressors. The Durbin-Watson aid in detecting serial-correlation in the framework. Based on the Durbin-Watson, it is clear there is evidence of no serial correlation in the three models. The next analysis is the ANOVA test, and the findings based on the ANOVA show that at 5% significant level, we fail to accept the null hypothesis and accept the alternative hypothesis that knowing the group membership provides extra information about the dependent variable. In the first model, it is clear that ICT positively and significantly influences risk-taking. In the second model, ICT influences innovativeness positively and significantly, and lastly, in the third model, ICT has a positive connection with proactiveness.

Conclusion

The motive of this research is to examine the influence of ICT on dimensions of entrepreneurial-orientation. The following questions were drafted towards achieving the study's purpose;

What influence does ICT have on Proactiveness among international student entrepreneurs in the TRNC?

What influence does ICT have on Risk-Taking among international student entrepreneurs in the TRNC?

What influence does ICT have on innovativeness among international student entrepreneurs in TRNC?

Questionnaires were distributed to international students who are entrepreneurs in the TRNC. 330 questionnaires were distributed among the international students; however, only 146 students properly filled out the questionnaires and returned them properly for computation. Their responses were inputted in excel worksheet, which was later transferred to SPSS for analysis. The study utilized the regression analysis to examine this interaction. Findings from this study revealed that ICT has a positive influence on entrepreneurial orientation among international students at TRNC. These findings are consistent with Theodora et al. (2008), Ahmad (2019), and Idrus et al. (2020). The theoretical concept has been evaluated through analytical methods to demonstrate the effect of ICT on market orientation. ICT is a tool that can enhance entrepreneurial-orientation. Such a study would also be of interest to foreign students employed in small and medium-sized businesses in the TRNC. The study concluded that there is a significant and positive interconnection between ICT and entrepreneurial-activities.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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References

- Abdo, D. M. (2007). Redefining the warring self in Hanan Al-Shaykh's *The Story of Zahra* and Frank McGuinness's *Carthaginians*. *Pacific Coast Philology*, 42(2), 217–237.
- Ahmad, S. (2019). The mediating role of innovation capability on ICT support, entrepreneurial orientation support and SMEs performances: A conceptual approach. *Journal of Global Business and Social Entrepreneurship (GBSE)*, 5(15).
- Anderson, B., Covin, J., & Slevin, D. (2009). Understanding the relationship between entrepreneurial orientation and strategic learning capability: An empirical investigation. *Strategic Entrepreneurship Journal*, 3(3), 21840. <https://doi.org/10.1002/sej.72>
- Antonicic, B. (2017). Intrapreneurship: A comparative structural equation modeling study. *Industrial Management & Data Systems*, 107(3), 309–325.
- Baharestan, A., Rezaei Dowlatabadi, H., & Akbari, C. (2012). *Explore the impact of information and communications technology and intellectual capital on corporate entrepreneurship (Case Sobhan Oncology)* [Paper presentation]. The second conference of student entrepreneurs, Tehran, Iran.
- Bhuian, S. N., Menguc, B., & Bell, S. J. (2005). Just entrepreneurial enough: The moderating effect of entrepreneurship on the relationship between market orientation and performance. *Journal of Business Research*, 58(1), 9–17.
- Bosma, N., Jones, K., Autio, E., & Levie, J. (2007). *Global entrepreneurship monitor, executive report*. Babson College and London Business School.
- Brown, T. E., Davidsson, P., & Wiklund, J. (2001). An operationalization of Stevenson's conceptualization of entrepreneurship as opportunity-based firm behavior. *Strategic Management Journal*, 22(10), 953–968.
- Christensen, V. (1994). On the behavior of some proposed goal functions for ecosystem development. *Ecological Modelling*, 75, 37–49.
- Covin, J. G., & Slevin, D. P. (1991). A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship Theory and Practice*, 16(1), 7–26.
- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. Sage Publications.
- Davidsson, P. (2004). *Researching entrepreneurship*. Springer.
- De Villiers, D., & Foba, T. W. (2007). The integration of intrapreneurship into a performance management model. *SA Journal of Human Resource Management*, 5(2), 1–8.
- Donaldson, L. (2001). *The contingency theory of organizations*. Sage.
- Drazin, R., & Van de Ven, A. H. (1985). Alternative forms of fit in contingency theory. *Administrative Science Quarterly*, 30(4), 514–539.
- Ekman, P., Friesen, W. V., & O'Sullivan, M. (1988). Smiles when lying. *Journal of Personality and Social Psychology*, 54(3), 414.
- Fan, R. E., Chang, K. W., Hsieh, C. J., Wang, X. R., & Lin, C. J. (2008). LIBLINEAR: A library for large linear classification. *Journal of Machine Learning Research*, 9, 1871–1874.
- Fiet, J. O., Norton, B., & Clouse, V. (2002). A test model of discovery by technically trained employees. In *Frontiers of Entrepreneurship Research XVII-SI*.
- Gartner, W. B., Gartner, W. C., Shaver, K. G., Carter, N. M., & Reynolds, P. D. (Eds.). (2004). *Handbook of entrepreneurial dynamics: The process of business creation*. Sage.
- Gedi, S., Reddy, V. R. M., Pejjai, B., Jeon, C. W., Park, C., & KT, R. R. (2016). A facile inexpensive route for SnS thin film solar cells with SnS₂ buffer. *Applied Surface Science*, 372, 116–124.

- Gerdin, J., & Greve, J. (2004). Forms of contingency fit in management accounting research—A critical review. *Accounting, Organizations and Society*, 29(3–4), 303–326.
- Hartono, H., & Herman, R. T. (2019). A study on competitiveness of ICT adoption and entrepreneurship orientation on SMEs in Indonesia. In *2019 International Conference on Information Management and Technology (ICIMTech)* (Vol. 1, pp. 53–57). IEEE.
- Heyshong, P. (2004). Factors that affect information technology adoption by teachers. 5(2), 569–576.
- Hindle, K., & Klyver, K. (2007). Exploring the relationship between media coverage and participation in entrepreneurship. *International Entrepreneurship Journal*, 3(2), 132–156.
- Hur, J., Yoon, C. H., Kim, H. S., Choi, J. H., Kang, H. J., Hwang, K. K., & Park, Y. B. (2004). Characterization of two types of endothelial progenitor cells and their different contributions to neovascularogenesis. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 24(2), 288–293.
- Idota, H., Bunno, T., & Tsuji, M. (2020). Impact of ICT on innovation: The case of Japanese SMEs. In *Disruptive technology: Concepts, methodologies, tools, and applications* (pp. 1624–1651). IGI Global.
- Idrus, S., Abdussakir, A., & Djakfar, M. (2020). The effect of entrepreneurial orientation and technology orientation on market orientation with education as moderation variable. *Management Science Letters*, 10(10), 2351–2360.
- Jafarzadeh, A., Fathi, M., & KÖKSAL, C., (2026). Evaluating financial performance of exchange-listed companies with integrated DEA and malmquist index, *Industrial Management Journal*, 18(2), 121-149. <https://doi.org/10.22059/imj.2026.409783.1008283>
- Jantunen, A., Puumalainen, K., Saarenketo, S., & Kylheiko, K. (2005). Entrepreneurial orientation, dynamic capabilities and international performance. *Journal of International Entrepreneurship*, 3(3), 223–243.
- Khandwalla, P. N. (1977). *The design of organizations*. [Publisher unknown].
- Knight, J., & McCabe, A. M. (1997). Identification and significance of ice-flow-transverse subglacial ridges (Rogen moraines) in northern central Ireland. *Journal of Quaternary Science*, 12(6), 519–524.
- Kollmann, T., & Christofor, J. (2014). International entrepreneurship in the network economy: Internationalization propensity and the role of entrepreneurial orientation. *Journal of International Entrepreneurship*, 12(1), 43–66.
- Kourilsky, M. L., & Walstad, W. B. (2002). The early environment and schooling experiences of high-technology entrepreneurs: Insights for entrepreneurship education. *International Journal of Entrepreneurship Education*, 1(1), 1–20.
- Kreiser, P. M., Marino, L. D., & Weaver, K. M. (2002). Assessing the psychometric properties of the entrepreneurial orientation scale: A multi-country analysis. *Entrepreneurship Theory and Practice*, 26(4), 71–93.
- Kuratko, D. F., Hornsby, J. S., & Hayton, J. (2015). Corporate entrepreneurship: The innovative challenge for a new global economic reality. *Small Business Economics*, 45(2), 245–253.
- Lamola, A. A., & Yamane, T. (1967). Sensitized photodimerization of thymine in DNA. *Proceedings of the National Academy of Sciences of the United States of America*, 58(2), 443.
- Linton, G. (2016). *Entrepreneurial orientation: Reflections from a contingency perspective* [Doctoral dissertation]. Örebro University.
- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135–172.

- Maxfield, M. G., & Babbie, E. R. (2014). *Research methods for criminal justice and criminology*. Cengage Learning.
- McGuigan, M., & Henderson, J. (2005). Organizational strategic innovation—How is government policy helping? *International Journal of Innovation and Technology Management*, 2(2), 197–215.
- Miller, D. (2011). Miller (1983) revisited: A reflection on EO research and some suggestions for the future. *Entrepreneurship Theory and Practice*, 35(5), 873–894.
- Miller, R. R., & Laborda, M. A. (2011). Preventing recovery from extinction and relapse: A product of current retrieval cues and memory strengths. *Current Directions in Psychological Science*, 20(5), 325–329.
- Morris, M. H., Kuratko, D. F., & Covin, J. G. (2008). *Corporate entrepreneurship and innovation*. Thomson/South-Western.
- Munir, M., Shabbir, M. Z., Yaqub, T., Shabbir, M. A., Mukhtar, N., Khan, M. R., & Berg, M. (2012). Complete genome sequence of a velogenic neurotropic avian paramyxovirus 1 isolated from peacocks (*Pavo cristatus*) in a wildlife park in Pakistan. [Source unknown].
- Murray, J. (2011, December 18). *Cloud network architecture and ICT - Modern Network Architecture*. TechTarget.
- Ngechu, M. (2004). *Understanding the research process and methods: An introduction to research methods* [Unpublished master's thesis]. University of Nairobi.
- Pourkeyvan, A., Safa, R., & Sorourkhah, A. (2024). Harnessing the power of Hugging Face transformers for predicting mental health disorders in social networks. *IEEE Access*, 12, 28025–35. <https://doi.org/10.1109/ACCESS.2024.3366653>
- Pourkeyvan, A., Safa, R., Sorourkhah, A.: Harnessing the Power of Hugging Face Transformers for Predicting Mental Health Disorders in Social Networks. *IEEE*
- Promoting technopreneurship. (2005, November 14). *Financial Times*.
- Rasouli Nejad, A., & Noory, M. (2009). Iran ICT impact on employment. *Journal of Economic Research*, 89(4), 87–107. (In Persian)
- Rwigema, H., Urban, B., & Venter, R. (2008). *Entrepreneurship: Theory in practice*. Oxford University Press Southern Africa.
- Sarasvathy, S. D., Dew, N., Velamuri, S. R., & Venkataraman, S. (2003). Three views of entrepreneurial opportunity. In *Handbook of entrepreneurship research* (pp. 141–160). Springer.
- Schindehutte, M., Morris, M. H., & Kocak, A. (2008). Understanding market-driving behavior: The role of entrepreneurship. *Journal of Small Business Management*, 46(1), 4–26.
- Shrader, R., & Siegel, D. S. (2007). Assessing the relationship between human capital and firm performance: Evidence from technology-based new ventures. *Entrepreneurship Theory and Practice*, 31(6), 893–908.
- Slater, S. F., & Narver, J. C. (1995). Market orientation and the learning organization. *Journal of Marketing*, 59(3), 63–74.
- Stevenson, D. J., Spohn, T., & Schubert, G. (1983). Magnetism and thermal evolution of the terrestrial planets. *Icarus*, 54(3), 466–489.
- Sutton, R. I., & Staw, B. M. (1995). What theory is not. *Administrative Science Quarterly*, 40(3), 371–384.
- Theodoros, A., Illias, P., & Panagiotis, K. (2008). *ICT impacts on Greek entrepreneurship accordingly to governmental programme* [Conference paper]. Haicta Conference.

- Urban, B. (2010). Technology and entrepreneurial orientation at the organisational level in the Johannesburg area. *SA Journal of Human Resource Management*, 8(1), 1–9.
- Van Hooren, S. A. H., Valentijn, A. M., Bosma, H., Ponds, R. W. H. M., Van Boxtel, M. P. J., & Jolles, J. (2007). Cognitive functioning in healthy older adults aged 64–81: A cohort study into the effects of age, sex, and education. *Aging, Neuropsychology, and Cognition*, 14(1), 40–54.
- Wales, W. J. (2015). Entrepreneurial orientation: A review and synthesis of promising research directions. *International Small Business Journal*.
- Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configurational approach. *Journal of Business Venturing*, 20(1), 71–91.
- Wong, W. K., Cheung, H. M., & Venuvinod, P. K. (2005). Individual entrepreneurial characteristics and entrepreneurial success potential. *International Journal of Innovation and Technology Management*, 2(3), 277–292.
- Yaghoubi, J. (2010). Factors hindering entrepreneurship in higher education in agriculture and provide mechanisms to strengthen it. *Journal of Entrepreneurial Development*, 8(2), 121–139. (In Persian)
- Zahra, S. A., Nielsen, A. P., & Bogner, W. C. (1999). Corporate entrepreneurship, knowledge, and competence development. *Entrepreneurship Theory and Practice*, 23(3), 169–189.

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	Model 1	Model 2	Model 3
R ²	0.903554	0.679468	0.886017
Adj R ²	0.90288	0.677226	0.88522
Std. Error	1.478755	2.290853	1.366096
Durbin Watson	1.98	2.05	1.76
a. Dependent Variables (Innovativeness, Proactiveness, and Risk-Taking)			
b. Predictor: ICT			

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