Technology Orientation Strategy and Innovation Performance in SMEs

The Mediating Role of Dynamic Capabilities

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Abstract

To deal with these fast changing business environments that characterise emerging economies and to seize the opportunities that these environments opens up, any size firms and especially SMEs must develop their dynamic capabilities to achieve sustained competitive advantages. This study investigates the role of a technology orientation on firm innovation performance by exploring the relationship between technology orientation strategy (TOS), different dynamic capabilities and innovation performance.
The research focuses on SMEs in Science and Technology Parks of Iran. So, this study uses survey data from a random sample of 154 small and medium enterprises (SMEs). Our findings support the hypothesis that the firm's technology orientation associate with innovation performance and also firm's dynamic capabilities positively mediate the relationship between technology orientation strategy and innovation performance. The results show that all dynamic capabilities (Integration, Learning, and Reconfiguration) plays an active role in the relationship between technology orientation strategy and innovation performance for small and medium enterprises.

Keywords: Technology Orientation Strategy, Dynamic Capabilities, Innovation Performance, SMEs

1. Introduction

In recent years, strategic orientation has received increasing interest from scholars due to its important role in Innovation performance. However, many companies have achieved superior performance by following a technology orientation (Chen et al., 2014; Boscoianu et al., 2017; Wang et al., 2018; Jiang et al., 2018). This calls for more research to extend studies among the various dimensions of strategic orientation in order to investigate about other types of strategic orientations. In rapidly changing markets firms may achieve to sustainable competitive advantage through their organizational and technological capabilities that enable them to monitor market changes to create, define, discover, and exploit new opportunities frequently and continuously well ahead of their competitors to match the requirements of the environment (Jantunen et al., 2005; Albort-Morant et al., 2016). Technology orientation is a key organisational capability in creating new products (Salavou, 2005) and dynamic capabilities have been proposed as a concept to build, integrate and reconfigure resources in the fast-changing environment (Teece et al., 1997), therefore, a combination of technological

behaviours and dynamic capabilities constitutes a potential source of competitive advantage in SMEs, especially in the highly volatile environment.

Given the evidence that technology orientation is beneficial to SMEs, our study seeks the effect of technology orientation strategy (TOS) on firm innovation performance and the mediating role of the dynamic capabilities on the relationship between these two constructs to bring clarity to the notion of technology orientation and dynamic capabilities and their potential and realized relationships to the innovation performance of SMEs in Science and Technology Parks of Iran. Based on a cross-sectional research design a postal questionnaire survey was designed to collect data from a random sample of 154 SMEs in Iran. Saavou (2005) noted the need to examine factors influencing the relationship between technology orientation and performance. Consequently, our article contributes to the literature by exploring the mediating effect of different dynamic capabilities engagement in this relationship. Assumed the centrality of knowledge to technology orientation and dynamic capabilities, this study seeks the influence of different types of dynamic capabilities in connection to technology orientation and firm performance. Accordingly, our article builds mainly on the dynamic capability view of the firm by using the approach of Teece et al. (1997).

Extending prior study, this article adopt a disaggregated view of strategic orientations to examine the role of technology orientations on firm innovation performance. Moreover, in our study we investigate how dynamic capabilities engagement effect on the relationship between technology orientation and innovation performance. The dynamic capabilities can be considered as a process to build, integrate and reconfigure internal and external resources to deal with market change (Eisenhardt and Martin, 2000). Based on the Teece's et al. (1997) approach, the dynamic capabilities can be characterized as the firm's capabilities for integration, learning and reconfiguration internal and external competence and resources. Therefore, we consider how three important dimensions of dynamic capabilities, including integration, learning and reconfiguration capabilities mediate the effect of technology orientation strategy in SMEs innovation performance.

Drawing on strategic orientation theory (Jaworski and Kohli, 1993; Narver and Slater, 1990; Tsou et al., 2014; Leng., et al., 2015) and dynamic capabilities view (DCV) of the firm (Teece et al., 1997), our major contributions are as follows: first, we identify technology orientation strategy as a strategic resource, in the SME context by identification of the direct effect of the technology orientation on innovation performance and development of dynamic capabilities. Second, the development of a broader model of dynamic capabilities in the SME context by investigation of the effectiveness of mediating effect of dynamic capabilities on improving innovation performance with respect to different dynamic capabilities. In summary, we suggest that SMEs can improve their innovation performance, when dynamic capabilities mediate technology orientation strategy.

The process of doing this in the present article is as follows. In the next section, we present some theoretical background and based on a review of the relevant literature, related hypotheses are developed. This is followed by a discussion of the research methodology, including the sample, the measures, and the analysis, followed by a presentation of the empirical results from the research. Finally, the article ends with a discussion of the findings of the article and the drawing of some academic and practical implications, limitations, and future research directions.

2. Theory and hypothesis

2.1 Technology orientation strategy and innovation performance

Integrating environmentally sustainable rules and regulations in business strategy and improving the innovation process has led to the creation of a strategic opportunity for

companies (Albort-Morant et al., 2016). Researchers argue that joint learning can serve as a key inter-organizational process in transforming various strategic goals into the company's innovation performance. In fact, to change strategic orientations for incremental and radical innovation, one can move with the use of joint learning ability (Jean et al., 2018). Therefore, strategic orientations can be defined as the firm's principles that lead and affect the firm's activities to interact with the market through a set of values and beliefs to create essential and proper behaviours for continuous superior performance (Gatignon and Xuereb, 1997). Different studies have developed their own orientation constructs. Brower and Rowe (2017) have analysed strategic orientations of customer, competitor, functional, and shareholder coordination. The results of this study showed that companies with a stronger orientation towards customers have higher levels of corporate performance. There are also some studies that concentrate only on one aspect of strategic orientation. For example, Jantunen et al. (2005) consider the firm's entrepreneurial orientation to investigate international performance. However, technology orientation as one of the most important aspect of strategic orientations is still somewhat fragmented (Hakala and Kohtamäki, 2011). The concept of technology orientation has been investigated from both individual (e.g., Saavou, 2005; Hakala and Kohtamäki, 2011) and corporate perspectives (e.g., Zhou et al., 2005; Zhou and Li, 2007). To date, the role and contribution of technology orientation in SMEs remains to some extent under-theorized as the literature mainly focuses upon large companies (Saavou, 2005; Hakala and Kohtamäki, 2011). Following Gatignon and Xuereb (1997), our study takes a view of technology orientation as one of the most important types of strategic orientations. It has been suggested by Gatignon and Xuereb (1997) that long term success of a firm depends on its technology orientation that guides the firm's attempt to create new technological solutions, products and services.

There is no universally accepted definition of technology orientation strategy. Technology orientation strategy guides the firm's attempt to achieve a superior technological capability to their competitors (Hakala and Kohtamäki, 2011). Based on a technology orientation concept that reflects the philosophy of "technological push," consumers prefer to choose and use products and services which are technologically superior. To deal with this rapid changes in new technologies, the firms need to update their technological base to improve their competitive advantage through new product development and innovation. Therefore, technology orientation can be considered as a crucial strategic orientation for the firm's success (Zhou and Li, 2007) and for that reason, we include technology orientation in our study to examine its impacts on firm performance.

Aragón-Sánchez and Sánchez-Marín (2005) suggested that technological development and innovation level guide the firm to achieve competitive advantages through creation a set of the basic elements. Also, Tsou et al., (2014) and Frank et al. (2016) have used market orientation and technology to advance innovative strategies. The results showed that market orientation strategy determines the priority of domestic and foreign R & D activities and product launch activities, and has a positive impact on innovation generation. Consequently, as noted by Hamel and Prahalad (1994) a technology-oriented firm can achieve a competitive advantage due to technology leadership and offering differentiated products, which often help the firm to improve its performance. Additionally, Gatignon and Xuereb (1997) and Voss and Voss (2000) argue that a high level of technology orientation leads the firm to be more innovative and develop technologically superior products compared to those offered by competitors and achieve superior performance. In addition, to cope with high levels of technological turbulence, firms must allocate more resources to technology development, experiment with the acquisition and application of the latest technologies, and manage uncertainty by innovations (Srinivasan et al., 2002). For these reasons, we predict that

H1: Technology orientation strategy has a positive and significant effect on innovation performance

2.2 Technology orientation, Dynamic capabilities and innovation performance

The notion of dynamic capabilities has been widely under research by previous studies (e.g. Makkonen et al., 2014; Cohen and Olsen, 2015; Mikalef and Pateli., 2017; Wang et al., 2018; Wang & Hsu., 2018; Efrat et al., 2018). However, there is no generally accepted and comprehensive definition of dynamic capabilities (Protogerou et al., 2012). It has been noted by Zollo and Winter (2002) that for a better understanding regarding the role of dynamic capabilities in the firm, it is crucial to divide dynamic capabilities from operational capabilities. Dynamic capabilities are those that enable a firm to constantly renew its operational capabilities and therefore achieve long-term competitive advantage (Protogerou et al., 2012, p.617). Therefore, dynamic capabilities can be described as the organizational and managerial processes and procedures that enable firms to achieve sustain superior performance over time (Wilden et al., 2013). On the other hand, strategies and international experiences in dynamic export capabilities are being developed to better understand the relationships between dynamic export capabilities of the company, namely compatibility, innovation, labor flexibility, its impact on competitive advantage and performance (Efrat et al., 2018).

Considering the approach of Teece et al. (1997), this paper distinguishes three dimensions of dynamic capabilities: dynamic integrating/coordinating, dynamic learning and dynamic reconfiguration capability. Integration capability is the firm's ability to assess the resources possessed by the firm and integrate them in order to create and develop new competences (Amit and Schoemaker, 1993). As noted by Cohen and Levinthal (1990) learning capability can be conceived of as an organizational operation to create competitive advantages through a dynamic and multi-level learning processes based on experimentation and repetition. Based on the extended definition of dynamic capabilities proposed by Amit and Schoemaker (1993) reconfiguration capabilities refer to the firm capability to reconstruct or transform existing resources in order to meet the environmental requirements in the fast-changing business environment.

Although the relationship between strategic orientations, dynamic capabilities and firm performance is well researched, and usually links strategy orientations to firm performance through dynamic capabilities engagement (Zhou et al., 2005; Voss and Voss 2000), but little research has been done in this area. For example Lin and Wu (2014) suggested that dynamic capabilities effectively mediate the firm's valuable assets to improve performance. Also, in studies by Albert-Morant et al. (2018), which included four metrics, learning capability, integration capabilities and synchronization capabilities for dynamic capabilities, the effects of dynamic capabilities on innovative green performance were remarkable. On the other hand, this study showed that when the level of relationship learning capabilities improves, the effects of dynamic capabilities will lead to the development of the company's innovation performance. Specifically, we investigate how the relationship between technology orientation and innovation performance may be mediated by dynamic capabilities. In fact, dynamic capabilities are viewed as the mechanisms that facilitates the creation of new advantages which are difficult to imitate by competitors (Borch and Madsen, 2007).

Following the approach of Teece et al. (1997), in this study firm dynamic capabilities have been classified into three specific groups; integration, learning and reconfiguration capabilities. The resources that are possessed by a firm can be classified as internal resources and other resources that a firm tries to obtain from outside of the firm by some method like cooperative alliances have been classified as external resources (Johnson and Sohi, 2003). Reconfiguration capability is a firm capability that reconstructs or transforms existing resources to new resources to address rapidly changing environments (Amit and Schoemaker,

1993). Dynamic capabilities are used to create competitive advantage in highly unstable environments. For this reason, the use of dynamic capabilities leads to the development of innovation capabilities (Froehlich et al., 2017). Accordingly, dynamic capabilities can be considered as a transformer that have this ability to convert firm' resources into improved performance (Protogerou et al., 2012).

As Aoki (1990) suggested firm competence is depended to the adequate integration of firm resources (internal and external). In addition, according to Iansiti and Clark (1994) there is a positive relationship between knowledge integration capability and firm performance. Studies show that, there is a major challenge in relation to product change versus services, in which dynamic capabilities management for measuring, arresting, and rebuilding service innovation is essential, And identifying key components is the basis for the successful modification of dynamic capabilities for identifying service innovation activities (Kindtrom et al., 2013). Based on Protogerou et al. (2012) "learning capability, can be conceived of as a principal means of attaining strategic renewal. Renewal requires that organizations explore and learn new ways while at the same time exploit what they have already learned". It can be suggested that the quality level of firm operations lies in the effective and efficient integration of repetition and review. According to Lubatkin et al. (2006) learning capabilities provide this opportunity to the firm to reduce the numbers of mistakes through the knowledge that creating from past experiences when they are developing or producing new products or services. Learning capabilities also enable firms to investigate new knowledge and develop new products (Yalcinkaya et al., 2007). Also, According to Hult et al. (2004) learning orientation has a positive influence on firm' innovative capability. In terms of Lin and Wu (2014; p.409) a firm can achieve internal learning "through training, knowledge database maintenance and knowledge sharing program". They also suggested that a firm can achieve external learning through external sources such as learning seminars and communities.

As Voss and Voss (2000) argued, the technology orientation can be considered as a main component of firm competitiveness that usually leads the firm to superior performance, and the mediating effect of dynamic capabilities engagement upon TO–SMEs' performance relationship is of critical importance (Saavou, 2005). Mikalef and Pateli (2017), by empirically examining the relationship between dynamic capabilities and IT capabilities, demonstrated that, despite the agility of market capitalization and agility of adaptability, competitive performance can be enhanced. Also, Zhou and Li (2010) indicate that strategic orientations are important drivers of adaptive capability and between three types of strategic orientation, technology orientation has a stronger effect on adaptive capability. According to Teece et al.(1997) reconfiguration capability can be considered as a key dynamic capability that monitors market changes in order to help the frim in response to these changes by an accurate reconfiguration on firm' resources. As Newbert (2005) suggested there is a relationship between reconfiguration capabilities and the success of new firm formation process. Lavie (2006) introduced a capability reconfiguration model to help the firms to cope with today's highly changeable technological environment. Moreover, there is no doubt that in this highly volatile environment, strategic flexibility is crucial for the firms in order to make them able to be more flexible to use and reconfigure their resources to respond to the market changes rapidly and accurately (Protogerou et al., 2012; Barreto, 2010). Finally, using the literature, we predict that each of the dynamic capabilities will mediate the relationship between technology orientation strategy and innovation performance.

H2: The integration capabilities of SMEs in the relationship between technology orientation strategy and innovation performance have a positive and significant impact.

H3: The learning capabilities of SMEs in the relationship between technology orientation strategy and innovation performance have a positive and significant impact.

H4: The reconfiguration capabilities of SMEs in the relationship between technology orientation strategy and innovation performance have a positive and significant impact.

Given the research literature and the description of the hypotheses, the conceptual model of this research is presented (Figure 1).

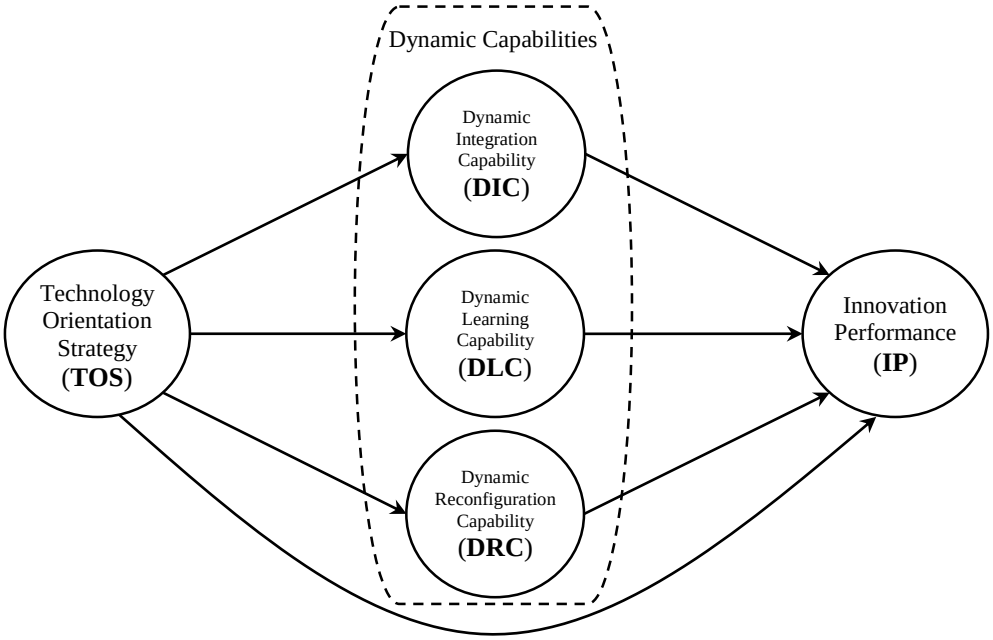

Figure 1: Conceptual Model

3. Methodology

3.1. Research type

This is a quantitative study and has a practical purpose. Also, its framework and structure is presented using previous studies and measures the relationship between variables. Accordingly, the measures were adopted from previous relevant studies and in order to provide an acceptable measurement quality a minor modification in wording were done to increase their applicability in the Iranian context.

3.2. Statistical population and sample

SMEs are important for all countries, because it increases the level of business performance and plays a significant role in the economy of each country. That's why, the statistical population of this study includes SMEs which located in Science and Technology Parks in Iran. These areas provide an appropriate context to test the hypotheses of this research because they are the most developed regions in Iran. In this study, a sample of 500 SMEs was selected randomly from a list of manufacturing firms.

3.3. Data collection and analysis tools

The measures that were designed for this study established in English and in order to be applied in Iran translated into Persian following the back-translation process to ensure

conceptual equivalence (Zhou and Li, 2010). To assess the content validity and accuracy of the survey items, 10 SMEs' senior managers in Iran were chosen to pre-test survey questions. As has been noted by Lin and Wu (2014) the aim of this pre-test is to assess the questionnaire and the administration process. The results indicated that there are a few items that need to be modified in order to reduce ambiguities in the wording. In order to increase response rate, an official university letter was prepared and enclosed to the questionnaires which explained the academic purpose of the research to the respondents and the confidentiality of their responses. Respondents also were informed to receive a summary report of the research. Additionally, after mailing the questionnaires, all respondents were re-contacted via phone to confirm that they had received the questionnaire and they also were asked to complete and return the questionnaire promptly. These efforts were highly effective and helpful. We obtained 154 completed surveys from 500 questionnaires distributed, representing 30.8% return rate. The present study was carried out using Structural Equation Modeling (SEM) through partial least squares (PLS). Data analysis was performed using Smart PLS software.

3.4. Measuring variables

This study used three constructs, including Technology orientation strategy, dynamic capabilities and innovation performance. Therefore, the technology orientation is measured using 4 items: sophisticated technologies with development of new technologies, state-of-the-art technology, and technological innovation based on research results, technological innovation in program/project management (Leng et al., 2015). Also, dynamic capabilities includes integration, learning and configuration capabilities. So, the integration capabilities is measured using 4 items: Understanding market needs and competitive advancement in the development of new products, understanding customer needs in developing new products, the ability to innovate for new product technology than competitors, The ability to improve the production process of new products than competitors (Johnson and Filippini, 2013). The learning capabilities is measured using 5 items: Diagnosing our staff training and educational needs, improving the firm's knowledge base and skills, learning new and relevant knowledge to undertake the firm's business activities, analysing the firm's unsuccessful activities, communicating the lessons learnt from the firm's past experiences across the entire firm (Sok et al., 2013). The configuration capabilities is measured using 4 items: We integrate internal and external technologies more successfully than competitors, we are more successful than competitors in commercial application of technologies to end market, we are more successful than competitors in diversifying into new markets by deploy in existing technologies, we are more successful than competitors in adapting our innovation process to market changes (Hawass, 2010). In this study, innovation performance measurement has been carried out from 6 items: the number of new products; the proportion of new product sales to total sales; the speed of new product development; the ratio of success; the number of patent applications; and the novelty of the new product (Wu et al., 2015). Also, all questions with a 5-level Likert scale are measured.

4. Results of the analysis

4.1. Analysis of the measurement model

In this research, from factor loadings, Cronbach's Alpha and Composite Reliability for measurement model assessment are used. Factor loads represent the level of relation between latent and observed variables. The acceptable value of this criterion is higher than 0/7. Also, the Cronbach's Alpha (CA) and Composite Reliability (CR) should be more than 0.7 (Hair et

al., 2017). The results of these indicators are presented in Table 1 and represent the factor loads and the appropriate reliability of the variables.

Table 1: Measures and Reliability

Variable	Items	Loadings	CA	CR	Variable	Items	Loadings	CA	CR
Technology Orientation Strategy (TOS)	TOS1	0.884	0.873	0.913	Dynamic Learning Capability (DLC)	DLC1	0.803	0.866	0.903
	TOS2	0.852				DLC2	0.807		
	TOS3	0.833				DLC3	0.829		
	TOS4	0.835				DLC4	0.805		
Dynamic Integration Capability (DIC)	DIC1	0.861	0.883	0.919		DLC5	0.790		
	DIC2	0.840			Innovation Performance (IP)	IP1	0.795	0.895	0.919
	DIC3	0.864				IP2	0.805		
	DIC4	0.879				IP3	0.824		
Dynamic Reconfiguration Capability (DRC)	DRC1	0.837	0.877	0.915		IP4	0.743		
	DRC2	0.835				IP5	0.843		
	DRC3	0.875				IP6	0.850		
	DRC4	0.871							

Note 1: CA= Cronbach's Alpha; CR= Composite Reliability
Note 2: All questions are 5 levels (1. Strongly Disagree; 2. Disagree; 3. Neutral; 4. Agree; 5. Agree Strongly)

The validity of the measurement model also includes divergent and convergent validity. The Average Variance Extracted (AVE) is used for convergent validity. This criterion shows the correlation of a variable with its indexes and its value should be above 0.5 (Hair et al., 2017). For the divergent validity, the Fornell-Larcker criterion is used. This criterion represents the further interaction of a variable with its own indicators relative to other indicators. Convergent and divergent convergent results are presented in Table 2 and shows that the variables have a high validity.

4.2. Structural model assessment

The coefficients of determination (R^2), Redundancy index (Q^2), and coefficient t are used to examine the structural model. R^2 represents the effect of the exogenous variable on an endogenous variable. R^2 values for weak, moderate and strong equals 0.19, 0.33 and 0.67 (Chin, 1998). Also, the value of R^2 when one or the maximum of two variables affects the inner variable, the value of 0.33 for R^2 is strong. The redundancy index is also for the prediction power of the model and it values for weak, moderate and strong equals 0.02, 0.15 and 0.35. (Henseler et al., 2009). The results show that the value of R^2 and the predictive power of the model are desirable (The results are in Table 2). Coefficients t are presented in the hypothesis analysis section.

Table 2: Descriptive statistics and validation measures

Variables	M	SD	AVE	R^2	Q^2	Fornell-Larcker				
						1	2	3	4	5
1. Dynamic Integration Capability	3.503	1.004	0.741	0.304	0.218	**0.860**				
2. Dynamic Learning Capability	3.704	0.879	0.650	0.233	0.135	0.660	**0.806**			
3. Dynamic Reconfiguration Capability	3.696	0.927	0.730	0.291	0.202	0.502	0.580	**0.854**		
4. Innovation Performance	3.771	0.878	0.657	0.544	0.116	0.625	0.620	0.575	**0.810**	
5. Technology Orientation Strategy	3.503	1.075	0.724	-	-	0.551	0.482	0.539	0.579	**0.851**

Note 1: AVE = Average Variance Extracted; M=Mean; SD= Standard Deviation; Q^2= Predictive Relevance Values.
Note 2: Bold numbers are the Radical of AVEs. Other numbers are correlations among the constructs.

4.3. Analysis of hypotheses

The Beta Index (β) specifies the causal linear relation and its intensity and direction between two latent variables. Its value is between +1 and -1 and a zero value indicates that there is no linear relationship between two latent variables. The output of the research model shows that all relationships between variables are significant (Figure 2).

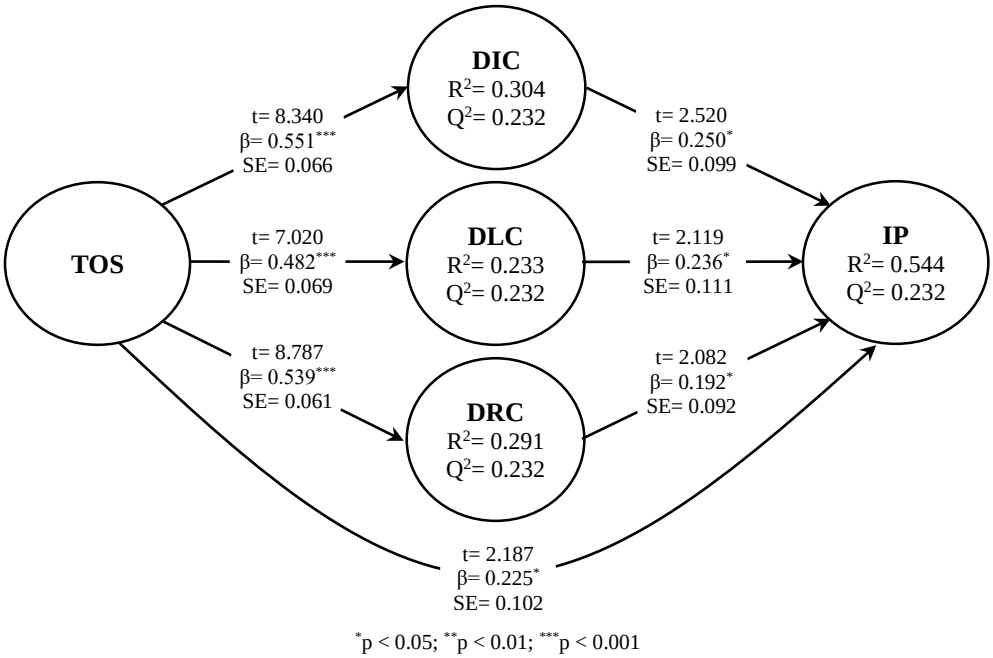

Figure 2: Model Output

Also, coefficient t the criterion measures the relationship between the variables of the model. When t value is more than 1.96, then the accuracy of the relationship between the construct and the research hypotheses in different significance levels is confirmed. According to the results, we see that all the research hypotheses are confirmed. The first hypothesis with coefficient β= 0.225 and coefficient t= 2.187; Second hypothesis with coefficient β= 0.138 and coefficient t= 2.421; Third hypothesis with coefficient β= 0.114 and coefficient t= 2.072 and fourth hypothesis with coefficient β= 0.103 and coefficient t= 2.019 are confirmed. Also, it should be noted that the analysis of the hypothesis of the mediation has been done with the Sobel Test. This test is performed using a formula. We also used the VAF index to measure the intensity of the impact. According to Hair et al. (2014), the VAF value more than 0.2, is a full mediator, the value between 0.2 and 0.8 is a partial mediator and a value of less than 0.2 percent means no mediator. The results of this indicator represent a partial mediation for examining all mediator variables. The results of the hypotheses are presented in Table 4.

5. Conclusion

5.1. Findings and discussion

Strategic orientation has long been acknowledged as the key factor for the existence of a firm (Zhou et al., 2005, Li, 2005). This study makes contributions to the literature on strategic orientation and dynamic capabilities research by exploring and testing the impact of the SMEs technological strategic orientation and different dynamic capabilities on their innovation performance. Through an empirical study of strategic orientation in SMEs, this study applies technology orientation as one of the most important aspects of strategic orientation to

investigate and deliberate its direct impact and the mediating effect of different dynamic capabilities on improving innovation performance.

Table 4: Results of research hypotheses

Paths	VAF	β	t	Results
H1: TOS → IP	-	0.225	*2.351	Supported
H2: TOS → DIC → IP	0.363	0.138	*2.421	Supported
H3: TOS → DLC → IP	0.336	0.114	*2.072	Supported
H4: TOS → DRC → IP	0.314	0.103	*2.019	Supported

Note 1: Mediation with Sobel Test. $t = \frac{a \times b}{\sqrt{(b^2 \times s_a^2) + (a^2 \times s_b^2) + (s_a^2 \times s_b^2)}}$; *p < 0.05, t = 1.96; **p < 0.01, t = 2.56; ***p < 0.001, t = 3.27.

Note 2: $VAF = \frac{a \times b}{\sqrt{(a \times b) + c}}$

a= The path coefficient between the independent variable and the mediator.
b= The path coefficient between the mediator variable and the dependent variable.
c= The path coefficient between the independent variable and the dependent variable.
s_a^2= Standard Error (SE) in the path between the independent variable and the mediator.
s_b^2= Standard Error (SE) in the path between the mediator variable and the dependent variable.
Note 3: Standard Errors (SE) are found in the output of the model.

Additionally, this study examines the effectiveness of mediating with respect to different dynamic capabilities. Our empirical findings show that dynamic capabilities improve the relationship between technology orientation strategy and innovative performance and lead to improved company performance. This finding regarding the relationship between technology orientation strategy, dynamic capabilities and innovation performance supports the conclusions of previous studies (Hakala and Kohtamäki, 2011; Albort-Morant et al., 2016; Mikalef and Pateli, 2017).

Despite the growing interest in strategic orientations and dynamic capabilities, there is a very limited investigation with respect to technology orientation effect on dynamic capabilities (Integration, Learning and Reconfiguration) and dynamic capabilities on the between technology orientation strategy and innovation performance in SMEs. In our opinion, these effects have not been investigated in this way. Regarding the relationship between technology orientation strategy and dynamic capabilities, path analysis demonstrates that technological orientation positively affect the development of integration, learning, and reconfiguration capabilities. On the other hand, the direct relationship between technology orientation and innovation performance was significant. These results can be in line with the research results of Tsou et al. (2014) and Leng et al. (2015). On the other hand, the effects of dynamic abilities on innovation performance were significant. According to Teece (2018), Dynamic Capabilities enables companies to gain values of innovation by building ecosystems and designing business models. Also, the ability to understand new opportunities in an organization to create promising opportunities in identifying strategic threats and opportunities will be helpful. To do this in today's changing markets, companies need to constantly identify their external environments to Detect new technologies, market needs, and changes in customer preferences as well as innovative intrusion threats (Teece. 2017).

Furthermore, our findings suggest that dynamic capabilities positively associated with mediate technology orientation to enhance firm innovation performance. Therefore, SMEs can improve their competitive advantages and thus their innovation performance with employing technology orientation strategy and developing dynamic capabilities in order to mediate technology orientation strategy. Accordingly, the important role of technology orientation strategy is addressed because of its direct effect on innovation performance and also its indirect effect mediated by dynamic capabilities. In addition, dynamic learning capability between other dynamic capabilities has the most significant mediating effect. Consequently, for SMEs

with technology orientation strategy, it is beneficial to develop dynamic learning capability through learning new knowledge, concept and expertise.

The analytical results of this study demonstrate that technology orientation strategy and three dynamic capabilities assist SMEs to achieve competitive advantages. Therefore, according to our results and combining strategic orientation view and dynamic capabilities view, an integrated consideration of both technology orientation strategy and dynamic capabilities can be suggested for SMEs to improve their performance.

The results from the present study provide empirical support for the dynamic capability view of the firm, which stresses the ability of moderating influence on the strength of the relationship between technology orientation strategy and innovation performance in the context of SMEs (Lin and Wu, 2014).

5.2. Limitations of the study and future research directions

Our study like other prior studies has some limitations which also provide some directions for future research. This study is subject to the usual limitations with a limited sample and subjective measures. The Science and Technology Parks in Iran provide the study context because using state-of-the-art technologies makes dynamic capabilities more prominent for SMEs operating there. Accordingly, because our empirical findings are based on data from Iran, generalize the findings of this study is limited. The survey data and evidence from different countries or other emerging or developed economies and across industries is required for generalization of the study at a broader level in order to assess the stability and generalisability of the research findings.

This study investigated the performance implications of a firm's dynamic capability and technological orientation in an Iranian SMEs context and due to applying the cross-sectional research design, this study limits to make causal implications. Thus, the study makes no claim to assess empirically the sustainability of technology orientation strategy and dynamic capabilities on SMEs innovation performance. Further studies should aim to use the longitudinal data to examine the sustainability of innovation performance advantage more accurately.

As different classification of dynamic capabilities may lead the study to different results, we hope that future research will take up further exploring and testing the different classification of dynamic capabilities to investigate the role of them. We also believe that future research could add to the literature by studying other strategic orientation (e.g. customer orientation, competitive orientation, innovation orientation and entrepreneurial orientation). So, all these orientations in a model will lead to a comprehensive framework.

References

Albort-Morant, J., Leal-Millán, A., & Cepeda-Carrión, G. (2016). The antecedents of green innovation performance: A model of learning and capabilities. Journal of Business Research, 69(11), 4912-4917.

Amit, R., & Schoemaker, P. (1993). Strategic assets and organizational RENT. Strategic Management Journal, 14(1), 33- 46.

Aoki, M. (1990). The participatory generation of information rents and the theory of the firm. The Firm as a Nexus of Treaties, Sage Publications, New York.

Aragon-Sanchez, A., & Sánchez-Marín, G. (2005). Strategic orientation, management characteristics, and performance: A study of Spanish SMEs. Journal of Small Business Management, 43(3), 287-308.

Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. Journal of management, 36(1), 256-280.

Borch, O. J., & Madsen, E. L. (2007). Dynamic capabilities facilitating innovative strategies in SMEs. International Journal of Technoentrepreneurship, 1(1), 109-125.

Boscoianu, M., Prelipcean, G., & Lupan, M. (2017). Innovation Enterprise as a Vehicle for Sustainable Development – a general framework for the design of typical strategies based on enterprise systems engineering, dynamic capabilities, and option thinking. Journal of Cleaner Production, 172, 3498-3507.

Brower, J., & Rowe, K. (2017). Where the eyes go, the body follows?: Understanding the impact of strategic orientation on corporate social performance. Journal of Business Research, 79, 134-142.

Chen, Y., Tang, G., Jin, J., Xie, Q., & Li, J. (2014). CEOs' Transformational Leadership and Product Innovation Performance: The Roles of Corporate Entrepreneurship and Technology Orientation. Journal of Product Innovation Management, 31(1), 2-17.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In: G. A. Marcoulides (Ed.), Modern Methods for Business Research (295-358). Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, J. F. & Olsen, K. (2015,). Knowledge management capabilities and firm performance: A test of universalistic, contingency and complementarity perspectives. Expert Systems with Applications, 42(3), 1178-1188.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation, Administrative Science Quarterly, 35(1), 128-152.

Efrat, K., Hughes, P., Nemkova, E., Souchon, A. L., & Sy-Changco, J. (2018). Leveraging of Dynamic export capabilities for competitive advantage and performance consequences: Evidence from China. Journal of Business Research, 84, 114-124.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. Strategic Management Journal, 21(10-11), 1105-1121.

Frank, A. G., Cortimiglia, M. N., Ribeiro, J. L. D., & de Oliveira, L. S. (2016). The effect of innovation activities on innovation outputs in the Brazilian industry: Market-orientation vs. technology-acquisition strategies. Research Policy, 45(3), 577-592.

Froehlich, C., Bitencourt, C. C., & Bossle, M. B. (2017). The use of dynamic capabilities to boost innovation in a Brazilian Chemical Company. Revista de Administração, 52(4), 479-491.

Gatignon, H., & Xuereb, J. (1997). Strategic orientation of the firm and new product performance. Journal of Marketing Research, 34(1), 77-90.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling. 2nd Ed. Thousand Oaks: Sage.

Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). A primer on partial least squares structural equation modeling (PLS SEM). Thousand Oaks, CA: Sage Publications.

Hakala, H., & Kohtamäki, M. (2011). Configurations of entrepreneurial-customer-and technology orientation: differences in learning and performance of software companies. International Journal of Entrepreneurial Behavior & Research, 17(1), 64-81.

Hamel, G., & Prahalad, C. K. (1994). Competing for the Future. Harvard Business School press, Boston, MA.

Hawass, H. H. (2010). Exploring the determinants of the reconfiguration capability: a dynamic capability perspective. European Journal of Innovation Management, 13(4), 409-438.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing. Advances in International Marketing, 20, 277-320.

Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004). Innovativeness: Its antecedents and impact on business performance", Industrial marketing management, 33(5), 429-438.

Iansiti, M., & Clark, K. B. (1994). Integration and dynamic capability: evidence from product development in automobiles and mainframe computers. Industrial and corporate change, 3(3), 557-605.

Jantunen, A., Puumalainen, K., Saarenketo, S., & Kyläheiko, K. (2005). Entrepreneurial orientation, dynamic capabilities and international performance. Journal of International Entrepreneurship, 3(3), 223-243.

Jaworski, B. J., & Kohli, A. K. (1993). Market orientation: antecedents and consequences. The Journal of marketing, 57(3), 53-70.

Jean, B. R-J., Kim, D., Chiou, J-S., & Calantone, R. (2018). Strategic orientations, joint learning, and innovation generation in international customer-supplier relationships. International Business Review, 27(4), 838-851.

Jiang, W., Chai, H., Shao, J., & Feng, T. (2018). Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective. Journal of Cleaner Production, 198, 1311-1323.

Johnson, J. L., & Sohi, R. S. (2003). The development of interfirm partnering competence: Platforms for learning, learning activities, and consequences of learning. Journal of Business Research, 56(9), 757-766.

Johnson, W. H. A., & Filippini, R. (2013). Integration capabilities as mediator of product development practices-performance. Journal of Engineering and Technology Management, 30(1), 95-111.

Kindström, D., Kowalkowski, C., & Sandberg, E. (2013). Enabling service innovation: A dynamic capabilities approach. Journal of Business Research, 66(8), 1063-1073.

Lavie, D. (2006). Capability reconfiguration: An analysis of incumbent responses to technological change. Academy of management review, 31(1), 153-174.

Leng, Z., Liu, Z., Tan, M., & Pang, J. (2015). Speed leaders and quality champions: Analyzing the effect of market orientation and technology orientation alignment on new product innovation. Management Decision, 53(6), 1247-1267.

Li, J. J. (2005). The formation of managerial networks of foreign firms in China: The effects of strategic orientations. Asia Pacific Journal of Management, 22(4), 423-443.

Lin, Y., & Wu, L. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. Journal of Business Research, 67(3), 407-413.

Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration, Journal of management, 32(5), 646-672.

Makkonen, H., Pohjola, M., Olkkonen, R., & Koponen, A. (2014). Dynamic capabilities and firm performance in a financial crisis. Journal of Business Research, 67(1), 2707-2719.

Mikalef, P., & Pateli, A. (2017). Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: Findings from PLS-SEM and fsQCA. Journal of Business Research, 70, 1-16.

Narver, J. C., & Slater, S. F. (1990). The effect of a market orientation on business profitability. The Journal of Marketing, 54(4), 20-35.

Newbert, S. L. (2005). New Firm Formation: A Dynamic Capability Perspective. Journal of Small Business Management, 43(1), 55-77.

Protogerou, A., Caloghirou, Y., & Lioukas, S. (2012). Dynamic capabilities and their indirect impact on firm performance. Industrial and Corporate Change, 21(3), 615-647.

Salavou, H. (2005). Do customer and technology orientations influence product innovativeness in SMEs? Some new evidence from Greece. Journal of Marketing Management, 21(3/4), 307-338.

Sok, P., O'Cass, A., & Sok, K. M. (2013). Achieving superior SME performance: Overarching role of marketing, innovation, and learning capabilities. Australasian Marketing Journal, 21(3), 161-167.

Teece, D. J. (2017). Dynamic capabilities and (digital) platform lifecycles. In: Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. Research Policy, 47(8), 1391-1399.

Teece, D. J. (2018). Profiting from innovation in the digital economy: standards, complementary assets, and business models in the wireless world. Res. Policy.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.

Tsou, H-T., Chen, J-S., & Liao, W-H. (2014). Market and technology orientations for service delivery innovation: the link of innovative competence. Journal of Business & Industrial Marketing, 29(6), 499-513.

Voss, G. B., & Voss, Z. G. (2000). Strategic Orientation and Firm Performance in an Artistic Environment. Journal of Marketing, 64(1), 67-83.

Wang, W., Cao, Q., Qin, L., Zhang, Y., Feng, T., & Feng, L. (2017). Uncertain environment, dynamic innovation capabilities and innovation strategies: A case study on Qihoo 360. Computers in Human Behavior, https://doi.org/10.1016/j.chb.2018.06.029.

Wang, Y-S., & Hsu, T-H. (2018). Dynamic capabilities of biologics firms in the emerging business market: Perspective of dynamic capabilities evident. Industrial Marketing Management, 71, 5-18.

Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic capabilities and performance: Strategy, structure and environment. Long Range Planning, 46(1), 72-96.

Wu, H., Chen, J., & Jiao, H. (2015). Dynamic capabilities as a mediator linking international diversification and innovation performance of firms in an emerging economy. Journal of Business Research, 69(8), 2678-2686.

Yalcinkaya, G., Calantone, R. J., & Griffith, D. A. (2007). An examination of exploration and exploitation capabilities: implications for product innovation and market performance. Journal of International Marketing, 15(4), 63-93.

Zhou, K. Z., & Li, C. B. (2010). How strategic orientations influence the building of dynamic capability in emerging economies. Journal of Business Research, 63(3), 224-231.

Zhou, K. Z., & Li, C.B. (2007). How does strategic orientation matter in Chinese firms?. Asia Pacific Journal of Management, 24(4), 447-466.

Zhou, K. Z., Yim, C. K., & Tse, D. K. (2005). The effects of strategic orientations on technology- and market-based breakthrough innovations. Journal of Marketing, 69(2), 42-60.

Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. Organization Science, 13(3), 339-51.