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Research paper

Capabilities and innovation: the moderating effect of environmental turbulence

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MARGARIDA VICENTE[1]
ANTÓNIO FIGUEIREDO[2]
ANTÓNIO MÁRIO RODRIGUES[3]

Abstract

Purpose - This study develops a framework to investigate the role of innovation as a mediator between capabilities and export performance. Specifically, this framework analyzes the consequences of marketing and technological capabilities and focuses on the relationships between marketing and technological capabilities, organizational innovation intensity, and export performance. In addition, we examine whether the effects of capabilities on innovation are moderated by high vs. low technological and market turbulence.

Design/methodology/approach - The study draws on data collected by an online questionnaire in a sample survey of 471 exporting manufacturing firms. A structural equation model was used to test the hypothesis.

Findings - The findings demonstrate that innovation has an important mediating role in the relationships between marketing and technological capabilities and export performance. Moreover, marketing capabilities have a stronger impact on innovation and export performance than technological capabilities. In both high vs. low technological turbulence, the innovation effects of marketing capabilities are higher than the effects of technological capabilities. Market turbulence does not moderate the relationship between capabilities and organizational innovation.

Originality/value - As the business environment becomes more global and uncertain, firms must balance their capabilities with export market conditions. This leads companies to trade-off the development of core capabilities that can improve competitiveness and export performance. This paper offers new insights on how marketing and technological capabilities, as two core organizational capabilities, contribute to superior export performance through the mediating role of innovation.

Keywords: Marketing capabilities; technological capabilities; organizational innovation intensity; export performance.

[1] Higher School of Technology and Management of Viseu. E-mail: margarida@estv.ipv.pt.
[2] Higher School of Technology and Management of Viseu. E-mail: ajfigueiredo@estgv.ipv.pt.
[3] Higher School of Technology and Management of Viseu. E-mail: amario@estgv.ipv.pt.

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1. Introduction

The current export business environment is dynamic and uncertain, and manufacturing firms need to continuously innovate in order to survival and succeed in the international arena (Efrat *et al.*, 2018).

According to the literature, innovation depends simultaneously on both marketing and technological skills (e.g., Danneels, 2002; Zhou *et al.*, 2005). These two capabilities are central organizational functions involved in a strategy that results into innovation practices (Hortinha *et al.*, 2011). Marketing capabilities are the firm's ability to understand and predict customer needs and to effectively link its products to these needs (Katsikeas, 1994; Sousa & Lages, 2011). Technological capabilities refer to the firm's accumulation of technological knowledge, including Research and Development (R&D) activities, that can be used to create new products or to improve existing ones (Kyläheiko *et al.*, 2011).

The information exchange between marketing and R&D departments allows a firm to develop differentiated and high quality products, at the most competitive prices (Renko *et al.*, 2009; Yam *et al.*, 2011). This ability to integrate such cross-functional expertise is essential to ensure continuous innovation, allowing to satisfy foreign customers even more than competitors (Krasnikov & Jayachandran, 2008). Specifically, we focus on exporting because capabilities development for exporting firms is a challenging and a risky process. In the international marketplace, firms face a dynamic environment with strong competition and rapid technological changes (Vicente *et al.*, 2015). In addition, the social, cultural, and other environmental differences between domestic and foreign markets make it very hard to predict possible changes in market requirements (Sousa & Lages, 2011). Therefore, improve understanding of capabilities, specifically those that contribute to higher innovation intensity, will enable exporting firms to develop innovative products that will translate into better performance in international markets.

Although previous research has contributed to our understanding about the importance of marketing and technological capabilities and their impact on firm performance (e.g., Song *et al.*, 2005), there is still a gap in the literature about the firms' ability to leverage marketing and technological capabilities into innovation. Previous studies do not investigate innovation as a mediating variable between capabilities (i.e. marketing and technological capabilities) and export performance. By ignoring innovation as a potential mediator in the capabilities-export performance relationship, these studies misrepresent what drives the performance of exporting firms. Furthermore, despite the recognition that it is important to study how firms use innovation to adapt to their environment and how this affects performance (Weerawardena & O'Cass, 2004), few studies analyze technological and market turbulence as key factors that may influence innovation in exporting firms.

This study contributes to the marketing and strategic management literature. By using the resource-based view theory, we investigate the mediating role of innovation in the relationship between capabilities (marketing and technological) and export performance. This offers new theoretical insights into how exporting firms may accomplish their performance goals, deploying their marketing and technological capabilities efficiently according to their innovation goals. In this sense, the maximum performance of marketing and technological capabilities may be achieved through organizational innovation intensity. In addition, we develop a better understanding of these two core organizational functions (marketing and technological), their individual and relative contribution to innovation and performance, and their impact on innovation under different environmental conditions. This offers new theoretical insights into

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which capabilities (marketing vs. technological) may successfully generate innovation and superior performance in dynamic export markets.

Finally, despite ample research on the innovation-performance relationship, previous studies have focused on technological innovations, leaving aside the effects of non-technological innovations.

The paper proceeds as follows. The next section offers the theoretical foundation and conceptual framework. The section thereafter describes the empirical procedures and presents the results. The subsequent section discusses the most important conclusions and implications. The last section addresses limitations and identifies critical avenues for further research.

2. Theoretical background and hypotheses

2.1. Theoretical background

In the exporting field, the resource-based view (RBV) is one of the most widely accepted theories to explain why firms in the same industry perform differently (e.g., Vicente, *et al.*, 2015). According to this theory (e.g., Barney, 1991; Newbert, 2007; Wernerfelt, 1984), capabilities that are difficult to copy by competitors (imperfectly inimitable) or difficult to obtain from the market (imperfectly mobilized) offer a potential basis to develop profitable market positions.

Marketing and technological capabilities are complex bundles of resources, skills and collective learning, based on knowledge that is tacit and, so, difficult to copy by competitors (Krasnikov & Jayachandran, 2008). However, even though the RBV considers these two capabilities critical sources of competitive advantage, their mere possession does not necessarily guarantee performance improvement. Sometimes, in the face of turbulent situations, capabilities can turn into core rigidities and may have a negative impact on some aspects of firm performance (Haas & Hansen, 2005). So, even when companies have strong capabilities, these capabilities will not always translate into value creation, unless firms effectively use them into new practices and innovative products that meet customers' needs better than the competition (Renko, *et al.*, 2009).

This means that it is through the achievement of innovation that marketing and technological capabilities are able to carry out their full potential in respect of performance (e.g., Eng & Okten, 2011). The power of marketing and technological skills in performance will only be fully apprehended through the development of innovation (e.g., Hortinha, *et al.*, 2011; Zhou, *et al.*, 2005).

Organizational innovation may generate different types and degrees of innovation (Vicente, *et al.*, 2015). The types of innovation can be categorized as technological (in products or processes) and non-technological (in marketing or managerial). The degree of innovation may be classified between incremental (implying the development of simple improvements in existing products) and radical (involving significant changes in the technology of existing products). Empirical evidence suggests that, in general, firms undertake all forms of innovation and both types of innovation, technological and non-technological, allow to improve performance in competitive international markets (Azar & Ciabuschi, 2017).

In this study, we conceptualize innovation in a broad sense including all types and degrees of innovation. We use organizational innovation intensity, which is defined as

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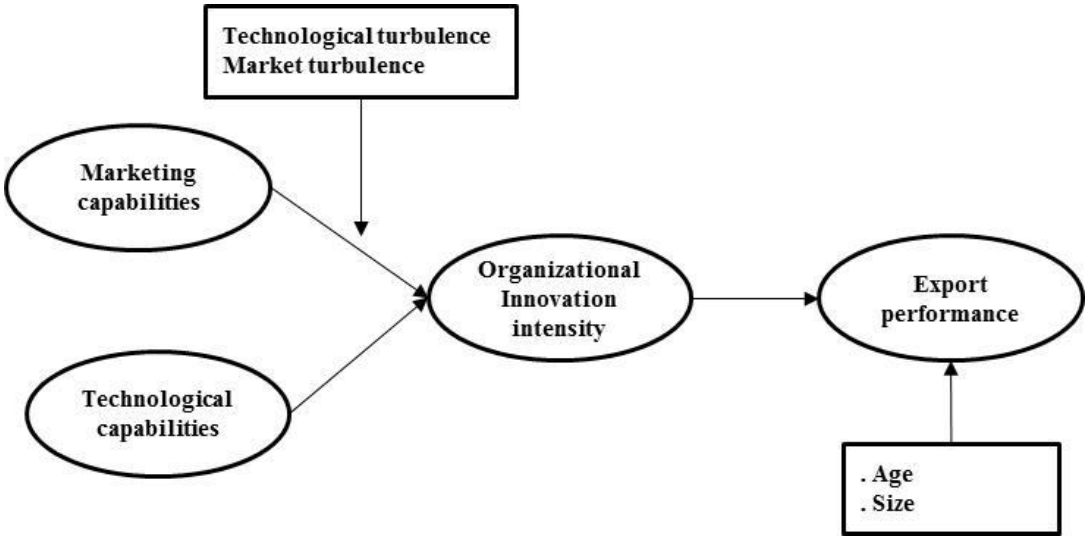
the ability to apply new ideas in products, processes, management and marketing systems, that will create added value either directly for the firm or indirectly for its customers (Weerawardena, 2003a, 2003b).

Our conceptual model is outlined in Figure 1. We use the RBV to support the theory that marketing capabilities, technological capabilities, and organizational innovation intensity are essential capabilities to attain superior export performance. Specifically, we consider that marketing and technological capabilities affect export performance through innovation. In this sense, organizational innovation intensity is a vehicle to renew firm's capabilities, such as marketing and technological capabilities, and thus to achieve superior performance in export markets.

Figure 1. Hypothesized relationships



Source: Authors.

2.2. The mediating effect of organizational innovation

Innovation is the key to growth in international markets, where the environment is increasingly competitive and turbulent (Azar & Ciabuschi, 2017). Exporting firms use their organizational innovation to adapt to technological changes and respond to market requirements more rapidly than competitors (O'Cass & Ngo, 2011). According to the literature, successful innovation requires firms to have competences relating to customers and technology (e.g., Hortinha, *et al.*, 2011). These competences can be respectively classified as marketing and technological capabilities.

Marketing capabilities are defined as the organizational routines needed for performing marketing mix activities such as pricing, product development, communication and distribution (e.g., Murray *et al.*, 2011; Zou *et al.*, 2003). Marketing is an important element to assess the success of exporting companies when they enter and compete in international markets (Tan & Sousa, 2015). It implies the creation of long-term customer relationships and organizational processes, whereby a firm uses knowledge about customers and competitors to create and deliver superior customer value (Krasnikov & Jayachandran, 2008; Narver & Slater, 1990). By delivering superior customer value, a firm increases the levels of customer satisfaction (Rust *et al.*, 2004), which contributes to the commercial success of the products and services marketed by the company (Day, 2014). For example, marketing capabilities allow to create

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innovative, unique and differentiated new products, and a strong brand image, providing a unique value to consumers that is difficult for competitors to imitate (Murray, *et al.*, 2011; Ngo & O'Cass, 2012). Therefore, marketing capabilities enable a firm to satisfy customers additionally, even more than its competition, and thus to obtain a greater performance in the export market (e.g., Murray, *et al.*, 2011; Vorhies & Morgan, 2005).

In addition, marketing capabilities have been established as an important key driver for organizational innovation (e.g., Ngo & O'Cass, 2012; Weerawardena, 2003b). They involve the integration of all marketing related activities using superior knowledge about customers' needs, competitive behaviors, and market trends (Nath *et al.*, 2010). In doing this, the firm's ability to capture value is stronger and the company is more likely to invest in value creation that will result into various innovation efforts (Ren *et al.*, 2015). Firms actively integrate their knowledge to develop radical changes in products, processes, marketing methods and managerial systems, which contribute to superior organizational innovation intensity (e.g., Mariadoss *et al.*, 2011; Weerawardena, 2003b). According to this, we propose the following hypothesis:

Hypothesis 1. The firm's marketing capabilities positively influence organizational innovation intensity.

They also include Research and Development (R&D) activities (e.g., Roper & Love, 2002).

Technological capabilities include the technological skills of individuals and work teams, processes and routines, and other technological assets that contribute to the firm's technological potential (Kyläheiko, *et al.*, 2011). These capabilities allow exporting firms to minimize R&D expenditures and decrease production costs more quickly than its competitors due to economies of scale (Kaleka, 2002). Consequently, a firm can charge a lower price for the same products or services, and thus increase its market share and business performance (e.g., Yam *et al.*, 2004).

Furthermore, there is empirical evidence that technological capabilities have a positive relationship to innovation (e.g., Gatignon & Xuereb, 1997). These competences represent the investment in the creation of technological knowledge, technology development, and know-how engendered by R&D that leads to improvement and successful innovation (e.g., Yam, *et al.*, 2011; Zhou & Wu, 2010). The possession of a more diverse technological knowledge allows exporters to capture more opportunities and as a result to develop more radical innovations (Quintana-García & Benavides-Velasco, 2008).

Technological capabilities are also related to the absorptive capacity for innovation (Cohen & Levinthal, 1990). They not only generate new information but also improve the firm's ability to assimilate and explore existing information in order to achieve innovation outcomes (Griffith *et al.*, 2004). The greater the firm's absorptive capability the higher its incremental and radical innovation (Forés & Camisón, 2016). In line with the above, we propose the following hypothesis:

Hypothesis 2. The firm's technological capabilities positively influence organizational innovation intensity.

Innovation increases the firm's ability to respond to changes in domestic and international markets (Zahra & Covin, 1994) and contributes to the improvement of business performance in the export arena (e.g., Yi *et al.*, 2013). Organizational

innovation intensity includes organizational routines for performing innovation activities related to products, processes, marketing and management (Weerawardena, 2003a, 2003b). Firms possessing a superior organizational innovation tend to develop new technologies, adopt more efficient production techniques, and introduce new and innovative products and processes (Kafouros *et al.*, 2008). The higher the value of innovative products, the higher the value that can be captured from its commercialization (Weerawardena, 2003a). Thus, firms that successfully implement extensive and radical changes in their value creating activities are more likely to outperform competitors and, thus, to increase their market share and economic performance (e.g., O'Cass & Weerawardena, 2009; Zhou, *et al.*, 2005). According to this, we propose the following hypothesis:

Hypothesis 3: The firm's organizational innovation intensity positively influences export performance.

The aforementioned discussion about the effects of marketing and technological capabilities on organizational innovation intensity, and the linkage between organizational innovation intensity and export performance, implies that innovation appears to mediate the relationship between capabilities (i.e. marketing and technological capabilities) and export performance. The degree to which marketing and technological capabilities can improve export performance may depend on how well they can lead to organizational innovation intensity. Thus, we propose the following hypotheses:

Hypothesis 4. The firm's organizational innovation intensity mediates the effect of marketing capabilities on export performance.

Hypothesis 5. The firm's organizational innovation intensity mediates the effect of technological capabilities on export performance.

2.3. The moderating effect of technological and market turbulence

A firm's environmental context is characterized by different degrees of turbulence that can have different impacts on innovation (e.g., Zhou, *et al.*, 2005) and performance (e.g., Song, *et al.*, 2005). Since the value of capabilities varies according to the environmental turbulence (Su *et al.*, 2013), it is important to analyze how technological and market turbulence influence the innovation effects of marketing and technological capabilities.

Technological turbulence reflects the degree of technological changes in the industry (Jaworski & Kohli, 1993). When technological turbulence is high, there are constantly significant changes in technology (Jaworski & Kohli, 1993). Thus, a firm can adapt by using its technological capability and developing more radical innovations (Zhou, *et al.*, 2005).

A high technological turbulent environment is characterized by accelerated product research and development, a shorter cycle of technological innovation and obsolescence (Atuahene-Gima *et al.*, 2006). So, the introduction of new products to replace the obsolete ones becomes crucial (Song, *et al.*, 2005). In this case, a company is more likely to explore new technologies and renew their technological capabilities, rather than conduct marketing activities (Song, *et al.*, 2005).

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Marketing capabilities have a small influence to keep up with technological changes or even to assimilate and explore new technologies (Song, *et al.*, 2005). Moreover, significant technological changes shorten marketing activities' life cycle and reduce the economic return of these activities (Su, *et al.*, 2013). Therefore, in higher levels of technological turbulence, the role of technological capabilities in the development of radical innovation becomes more important than the importance of marketing capabilities. According to this, we propose the following hypotheses:

Hypothesis 6. The relationship between technological capabilities and organizational innovation intensity will be stronger at higher levels of technological turbulence.

Hypothesis 7. The relationship between marketing capabilities and organizational innovation intensity will be weaker at higher levels of technological turbulence.

Market turbulence reflects the degree of change in customers' preferences in the industry (Jaworski & Kohli, 1993). When market turbulence is high, customers are constantly searching for new products and services, and new buyers are entering on a regular basis (Jaworski & Kohli, 1993). In this situation, firms need to gain a clear understanding of changes in customers' preferences and continually modify their offers in order to create superior customer value (Jaworski & Kohli, 1993).

Although firms can use technological capabilities to develop new products to meet new customers' needs and wishes, there is a time gap between the emergence of new preferences and the development of new products (Su, *et al.*, 2013). When the company develops a new product, there may have already been a change in consumer preferences, which reduces the economic return of technological capabilities (Su, *et al.*, 2013).

Under the conditions of high market turbulence, marketing activities are particularly important to satisfy the evolving needs of customers (Jaworski & Kohli, 1993). The knowledge about customers' preferences allows the firm to continuously adapt price, product, marketing communication and distribution capabilities, and thus to engage in activities that successfully respond to market changes and uncertainties (Atuahene-Gima, *et al.*, 2006). Therefore, in a high market turbulent environment, companies are more likely to have a greater need of marketing activities, rather than explore new technologies. In line with the above, we propose the following hypotheses:

Hypothesis 8. The relationship between technological capabilities and organizational innovation intensity will be weaker at higher levels of market turbulence.

Hypothesis 9. The relationship between marketing capabilities and organizational innovation intensity will be stronger at higher levels of market turbulence.

3. Methodology

3.1. Sample and data collection procedure

Data for this study were collected in 2012, using a sample of Portuguese exporting manufacturers. The study focuses exclusively on export manufacturing firms, similar to

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other studies (e.g., Lages *et al.*, 2008). Service export firms were excluded because of their idiosyncratic features regarding international expansion, legal regulations and performance (Morgan *et al.*, 2004).

An analysis was carried out at an export venture level, which is defined as the export of a single product (or product line) to a single market (Cavusgil & Zou, 1994). Export venture is the main unit of analysis in the most recent studies on exporting (e.g., Kaleka, 2012).

We selected a random sample of 3000 firms from the Trade & Investment Agency (AICEP Portugal Global) government database. To ensure data source reliability, the person more involved in the firm's export operations was considered as key respondent. The use of a single key informant reduces potential sources of systematic and random errors (Huber & Power, 1985). Also, it is appropriate when this person has exclusive access to the necessary information or is more likely to provide accurate information (Sousa *et al.*, 2008).

An online questionnaire, developed from the open source software "LimeSurvey", was the basis of the data used to test the model. Of the 3000 e-mails sent, 159 were returned to the recipient's mail server, 3 firms informed they were no longer in business, and 98 firms declined to participate. In consequence, the final sample size was 2740 firms. We obtained 471 valid questionnaires, which corresponds to a response rate of 17%.

3.2. Assessment of non-response bias

In order to analyze possible bias due to "non-response", a test was conducted to verify whether there were differences between early and late responding firms (Armstrong & Overton, 1977). The 353 questionnaires obtained during the first three weeks define early responding firms (75% of total respondents). The last 118 completed questionnaires define late responding firms (remaining 25%). The late responding firms more closely resemble non-responding firms than they do early responders (Armstrong & Overton, 1977). We compared the two groups using t-test with regard to the means of all study variables in Figure 1. No differences were found, thereby non-response bias does not appear as a problem for this analysis.

3.3. Assessment of common method variance

The use of a single key informant creates the potential for common method variance to influence any relationships observed (Morgan *et al.*, 2012). To minimize this risk, we followed the procedures recommended by Podsakoff *et al.* (2003): respondents' anonymity was guaranteed; respondents were assured that there were no right or wrong answers; and the order of the measurement of both the independent and dependent variables were counterbalanced.

The existence of common method bias implies that a confirmatory factor analysis containing all constructs produce a single factor (Podsakoff & Organ, 1986). The goodness-of-fit indices for the Harman's one-factor model indicate a poor fit (NNFI= 0.73, CFI=0.75, RMSEA=0.202), suggesting that common-method bias is unlikely.

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3.4. Measures

The items used to operationalize each construct were adapted based on existing literature. Well-validated measures reported in previous research were used. All constructs in the model were measured with multiple-item scales (see Appendix). In addition, we included two control variables that may affect a firm's organizational innovation intensity and export performance. Firm age was measured by the logarithm of firm age in years. Firm size was measured by the total number of full-time employees using a scale derived from Lages *et al.* (2008).

3.5. Survey Instrument Development

The research instrument was created based on an extensive literature review on the major subjects pertaining to this study. The translation was performed using the method of back translation to ensure accuracy (Brislin, 1970). In order to improve content validity and questionnaire clarity, a pre-test was conducted to a sample of 10 managers responsible for the export operations of their companies. The results contributed to the refinement of the questionnaire.

3.6. Data profile

Firm size was measured by the number of full-time employees. 26% of the firms employed less than 10 people, 18% had between 10 and 19 employees, 25% had between 20 and 49 employees, 15% had between 50 and 99, 12% had between 100 and 499, and 4% had 500 or more employees. The average age of the firms included in the sample is approximately 27 years (SD=20.69, range=1-128). The vast majority of the firms had considerable exporting experience.

4. Results

To refine the measures and assess the reliability and validity of the constructs, the items were subjected to an exploratory factor analysis (EFA) followed by a confirmatory factor analysis (CFA), using maximum likelihood estimation procedures in LISREL 8.8 (Jöreskog & Sörbom, 1993).

4.1. Measurement model

In this model, the first-order constructs are pricing capability, product development capability, communication capability, distribution capability, technological capability, organizational innovation intensity, export performance, technological turbulence and market turbulence. The overall chi-square for this model is significant ($\chi^2(576)=1997.03$, $p<0.00$). Four measures of fit were examined: the Bentler non-normed fit index (NNFI=0.93), the comparative fit index (CFI=0.94), and the root mean square error of approximation (RMSEA=0.072). The results suggest that the scale measures were internally consistent, able to provide a good fit of the factor model to the data.

Item reliabilities were assessed examining the loadings of the individual items in the respective constructs. The average loading size for all constructs is 0.79.

Convergent validity was assessed by calculating the average variance extracted (AVE) (Fornell & Larcker, 1981). All values are greater than 0.5, indicating convergent validity.

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Composite reliability (Bagozzi, 1980) was also calculated for each construct. All constructs meet the suggested minimum acceptable level for composite reliability of 0.7 (Nunnally & Bernstein, 1994).

Discriminant validity was assessed by observing the construct intercorrelations. The root of AVE for each construct was compared with the shared variance between constructs. The square root of the AVE should be greater than the correlation between a construct and any other construct (Fornell & Larcker, 1981). Table 1 provides an overview of the means, standard deviations, and correlation matrix regarding the constructs. Adequate discriminant validity is evident since the square root of AVE, between any two constructs (diagonal), is greater than the correlation between those constructs (off-diagonal).

Table 1. Means, standard deviations, and correlations among constructs[a,b]

Construct	Mean	Standard deviation	1	2	3	4	5	6	7	8
1. Pricing capability	3.31	0.71	**0.71**							
2. Product development capability	3.35	0.69	0.38**	**0.76**						
3. Communication capability	3.22	0.83	0.30**	0.49**	**0.94**					
4. Distribution capability	3.53	0.73	0.20**	0.44**	0.43**	**0.85**				
5. Technological capabilities	3.46	0.78	0.22**	0.60**	0.42**	0.30**	**0.75**			
6. Export performance	3.32	0.66	0.22**	0.58**	0.48**	0.32**	0.54**	**0.77**		
7. Organizational innovation intensity	2.82	0,87	0.19**	0.40**	0.28**	0.23**	0.26**	0.44**	**0.83**	
8. Technological turbulence	3.78	0.68	0.09	0.30**	0.08	0.12*	-0.01	0.06	-0.02	**0.74**
9. Market turbulence	3.30	0.83	0.19**	0.34**	0.25**	0.23**	0.34**	0.26**	0.12*	0.44**
9. Age	2.97	0.92	-0.08	-0.09	-0.13	-0.08*	-0.08	-0.08*	0.01	-0.07
10. Size	2.82	1.48	-0.08	0.01	-0.05	-0.07	0.05	0.08	0.19**	-0.018

[a] *p<0.1, **p<0.05, ***p<0.01
[b] The diagonal (in bold) shows the square roots of the average variance extracted.

Source: Authors.

In this model, marketing capabilities are a second-order construct composed of four first-order indicators: pricing capability, product development capability, communication capability and distribution capability. To establish that marketing capabilities are a single second-order factor, following previous research (Calantone *et al.*, 2002), the null hypothesis that the first-order factors converge to a single higher-order construct was tested. Measures of goodness of fit support the null hypothesis that the first-order factors converge to a single higher-order construct ($\chi^2(86)=266.77$, $p<0.00$, NNFI=0.97, CFI=0.98, RMSEA=0.067). According to the results, pricing capability ($\beta=0.45$, t-value=7.28), product development capability ($\beta=0.74$, t-value=10.67), communication capability ($\beta=0.68$, t-value=12.33) and distribution capability ($\beta=0.60$, t-value=10.15) are first-order indicators of the higher-order construct of marketing capabilities. The higher-order construct explains 20%, 55%, 47%, and 36% in variation of the first-order factors, respectively.

4.2. Hypothesis testing

The conceptual framework was tested using structural equation modeling (SEM). To examine how organizational innovation intensity may act as a mediator in the relationship between capabilities (marketing and technological capabilities) and export performance, we adopted the SEM approach outlined by Mackinnon (2002). We estimated a baseline model as the full mediation model (see Figure 1), which did not have any direct paths from the two predictors (marketing and technological capabilities) to the export performance outcome. The results suggest a good fit of the model to the data ($\chi^2(607)=2095.99$, $p<0.00$, NNFI=0.93, CFI=0.94, RMSEA=0.072).

Following the approach advocated by Anderson & Gerbing (1988), we tested a series of nested models against our baseline model through sequential chi-square tests with the parameter constraints of interest in this study. We compared our baseline model with the fit of three partial mediation models. In comparison to the baseline model (hypothesized fully mediated model), Model 1 add path from marketing capabilities to export performance, Model 2 add path from technological capabilities to export performance, and Model 3 add path from marketing and technological capabilities to export performance.

As shown in Table 2, the chi-square difference between Model 3 (partial mediation model) and our baseline model (full mediation model) was significant ($\Delta\chi^2=18.03$, $\Delta df=2$, $p<0.01$). This finding suggests that adding the two direct paths (marketing and technological capabilities to export performance) to the baseline model significantly improved the model fit.

Table 2. Results of alternative model comparisons

Models	χ^2	df	$\Delta\chi^2$	Δdf	NNFI	CFI	RMSEA
Baseline Model (Hypothesized fully mediated model)	2095.99	607	---	---	0.93	0.94	0.072
Model 1	2082.92	606	$\Delta\chi^2_{(b,m1)}=13.07$**	1	0.93	0.94	0.072
Model 2	2096.30	606	$\Delta\chi^2_{(b,m2)}=0.31$	1	0.93	0.94	0.072
Model 3	2077.96	605	$\Delta\chi^2_{(b,m3)}=18.03$**	2	0.93	0.94	0.072
Model 4	2154.40	602	$\Delta\chi^2_{(m3,m4)}=76.44$**	3	0.93	0.93	0,074
Model 5	2090.22	606	$\Delta\chi^2_{(m3,m5)}=12.22$**	1	0.93	0.94	0.072

NNFI-Bentler non-normed fit index; CFI-Comparative fit index; RMSEA-Root mean square error of approximation; SRMR-Standardized root mean square residual.
*p<0.05, **p<0.01
Baseline model: full mediation (no direct paths from predictors to outcome).
Model 1: partial mediation model (baseline model plus direct path from marketing capabilities to outcome).
Model 2: partial mediation model (baseline model plus direct path from marketing capabilities to outcome).
Model 3: partial mediation model (baseline model plus direct paths from marketing and technological capabilities to outcome).
Model 4: direct effects model (the paths from marketing capabilities and technological capabilities to organizational innovation intensity was constrained to zero).
Model 5: non-mediation model: the paths from organizational innovation intensity to export performance were constrained to zero.

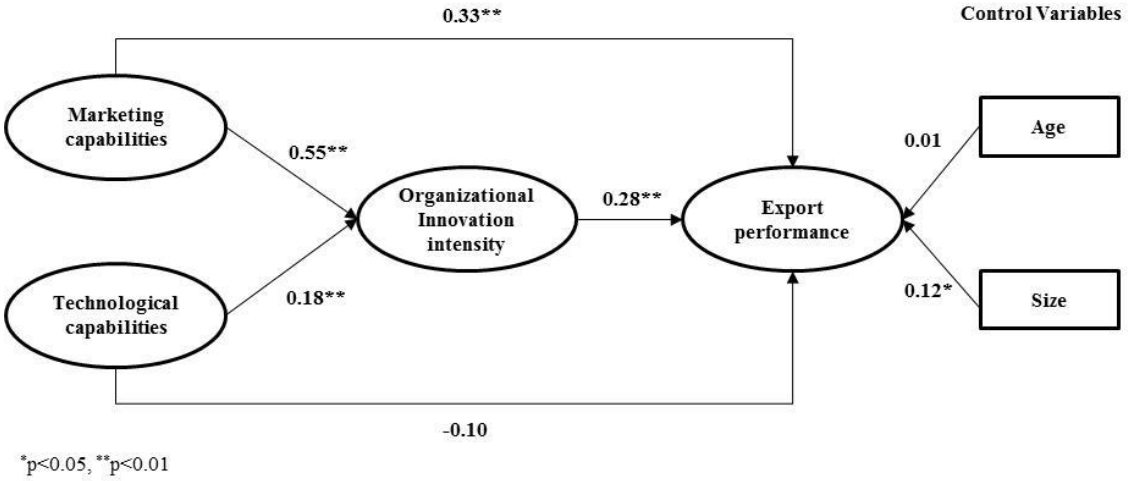
Source: Authors.

To eliminate alternative explanations, we tested two alternative models. The first is that there is no causal relationship between marketing and technological capabilities and organizational innovation intensity (Model 4). In this case, organizational innovation is a simple capability that contributes to export performance in the same way that marketing and technological capabilities. The chi-square difference test suggested that the partial mediation model (Model 3) fit the data better than the direct effect model ($\Delta\chi^2=76.44$, $\Delta df=3$, $p<0.01$). The second alternative explanation is that there is no relationship between organizational innovation intensity and export performance. That is to say, although organizational innovation is useful, it plays a trivial role in enhancing

export performance. To exclude this possibility, we tested a non-mediation model (Model 5), in which the path from organizational innovation intensity to export performance was constrained to zero. The chi-square difference test suggests that the partial mediation model (Model 3) fit the data better than the non-mediation model ($\Delta\chi^2$=12.22, Δdf=1, p<0.01).

Figure 2 presents standardized parameter estimates, t-values, and significance levels for the partial mediation model. This is the final model, and best illustrates the results of the hypothesis testing.

Figure 2. Final model



Source: Authors.

Consistent with H1, marketing capabilities positively influence organizational innovation intensity (β=0.55, t-value=7.38). In line with H2, technological capabilities have a significant positive impact on organizational innovation intensity (β=0.18, t-value=2.64). Consistent with H3, organizational innovation intensity has a significant positive impact on export performance (β=0.28, t-value=3.90).

Hypotheses 4 and 5 state that organizational innovation intensity mediates the relationship between marketing capabilities and export performance, as well as the relationship between technological capabilities and export performance. The results of our different models, with and without direct paths from the predictors to the outcome variable, provide support for the mediation effect. Based on the individual parameter estimates of the best-fitting model, we find support for the mediating role of organizational innovation intensity in the relationships between marketing and technological capabilities and export performance. Therefore, Hypotheses 4 and 5 are supported.

In addition, we compare the effect of marketing and technological capabilities on organizational innovation and export performance. The results show that marketing capabilities have a stronger impact on organizational innovation than technological capabilities (β=0.55, t-value=7.38 and β=0.18, t-value=2.64, respectively). In the same way, marketing capabilities have a stronger effect on export performance than

technological capabilities. Both the direct (β=0.33, t-value=3.53) and indirect (β=0.15, t-value=3.73) effects of marketing capabilities on export performance are found to be positively statistically significant. Consequently, the indirect relationships strengthen the total effect (β=0.48, t-value=5.81). However, the direct effect of marketing capabilities on export performance is stronger than the indirect effect.

The multigroup analysis of structural equation modeling was used to test the moderating effect of technological and market turbulence on the relationship between marketing and technological capabilities and organizational innovation intensity.

The sample was split into two groups based on the mean level of technological and market turbulence. The results above the mean were defined as a high turbulence environment and those below the mean were defined as low turbulent (e.g., Song, *et al.*, 2005).

First, a two-group comparison was performed to examine whether there were differences in structural parameters between environments with high vs. low technological turbulence. We estimated two models: one in which we constrained the paths between the two capabilities (marketing and technological), organizational innovation intensity, and export performance to be the same across both groups; and another in which we allowed the path coefficients to vary freely (Hair *et al.*, 2010). The chi-square difference test was statistically significant ($\Delta\chi^2(33)=59.41$, $p<0.05$), indicating that there are differences between the two groups.

The path coefficients revealed that the relationship between marketing capabilities and organizational innovation intensity is similar for both groups (high-turbulence group: β=0.60, t-value=6.66; low turbulence group: β=0.57, t-value=5.70). The relationship between technological capabilities and organizational innovation intensity is stronger in the low turbulence group (high-turbulence group: β=0.17, t-value=2.01; low turbulence group: β=0.25, t-value=2.57). In addition, the effect of organizational innovation intensity on export performance is stronger for high turbulent environment (high turbulence group: β=0.40, t-value=4.17; low-turbulence group: β=0.14, n.s.). Therefore, the results obtained to some extent support the hypothesized moderating impact of technological turbulence, so hypotheses 6 and 7 are partially supported.

Second, a two-group comparison was performed to examine whether there were differences in structural parameters between environments with high vs. low market turbulence. The chi-square difference test between the two models was not statistically significant ($\Delta\chi^2(31)=30.58$, n.s.), indicating that there are no differences between the two groups. Therefore, the results obtained do not support the hypothesized moderating impact of market turbulence, so hypotheses 8 and 9 are not supported.

5. Discussion

This study empirically examines how marketing capabilities, technological capabilities, and organizational innovation intensity contribute to superior export performance. More specifically, we analyze the mechanism that underlies the relationship between capabilities (marketing and technological) and export performance, which is the mediating effect of organizational innovation intensity. In addition, we incorporate the moderating effect of technological and market turbulence (high vs. low) in the theoretical model.

The findings demonstrate that marketing capabilities have a significant and positive impact on export performance. This is in line with previous works that state that

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marketing skills enable a firm to design and develop new products that meet customers' needs, respond to competitive pricing tactics, manage good relationships with distributors, and deliver marketing communications effectively, which results in superior performance in export markets (e.g., Tan & Sousa, 2015).

As expected, marketing capabilities have a significant and positive impact on organizational innovation intensity. The results support the argument that firms with superior marketing skills are more likely to invest in innovation (Ren, *et al.*, 2015), developing radical changes in products, processes, marketing methods and managerial systems (Weerawardena, 2003b).

Technological capabilities have a significant and positive impact on organizational innovation intensity. This is consistent with previous research, that points out that the investment in the creation of technological knowledge enables firms to achieve innovation outcomes (e.g., Griffith, *et al.*, 2004).

As anticipated, organizational innovation intensity has a significant impact on export performance. This is in line with earlier works that state that innovation is a source of competitive advantage in international markets enabling firms to increase their export performance (e.g., Azar & Ciabuschi, 2017).

Contrary to expectations, technological capabilities have no significant effect on export performance. This can be due to the fact that R&D investments do not always generate immediate returns (Eng & Okten, 2011). Consequently, technological capabilities contribute to export performance only indirectly by the mediating effect of organizational innovation.

Overall, this study demonstrates how marketing and technological capabilities may increase export performance through organizational innovation intensity. In this case, organizational innovation intensity plays a mediating role, acting as a significant intermediate variable between capabilities (marketing and technological) and export performance. This means that adopting innovations for the development of a foreign market is valuable to export performance.

Furthermore, the results show that marketing capabilities have a stronger impact on organizational innovation intensity and export performance than technological capabilities. This is consistent with Krasnikov & Jayachandran (2008), who found that marketing capabilities have a stronger impact on performance than other business capabilities such as R&D and operations capabilities.

One explanation for the previous outcome is that marketing and technological capabilities differ in their ability to make it difficult to copy and difficult to obtain from the market the knowledge that supports them (Krasnikov & Jayachandran, 2008). Marketing capabilities, which are based in market knowledge about customers' needs, are complex in nature and thus difficult to codify (Vorhies & Morgan, 2005). Consequently, they are less likely to imitate or to substitute others capabilities. Technological capabilities, which are likely to be more codified, through licensing for example, are relatively more vulnerable to imitation and more mobile than marketing capabilities (Eisend *et al.*, 2016).

Surprisingly, the innovation impact of deploying marketing capabilities is the same in both high and low technologically turbulent environments. Also surprisingly, the innovation impact of deploying technological capabilities is higher in low technologically turbulent environment. This is probably due to the influence of capabilities on organizational innovation intensity that depends on the institutional

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context in different markets and, thus, varies across countries (Eisend, *et al.*, 2016). In both high and low turbulence, the innovation effects of marketing capabilities are higher than the effects of technological capabilities, which emphasize the importance of marketing in these two different circumstances. Therefore, marketing activities are linked to the potential benefits of being innovative, in both stable and turbulent technological environments.

6. Implications

The key finding in this study is that marketing and technological capabilities positively influence export performance, through the development of both technological and non-technological innovation. In other words, marketing and technological capabilities are likely to provide an exporting firm with innovative practices that contribute to superior export performance.

This is an important finding with regard to the discussion about the role of marketing and technology as firm value capturing capabilities (e.g., Ren, *et al.*, 2015). Some previous studies suggest that marketing and technological capabilities have a direct impact on performance (e.g., Song, *et al.*, 2005). Other studies indicate that marketing capabilities can only be translated into innovative capability through the path of technological capabilities (e.g., Eng & Okten, 2011). Some other studies demonstrate that marketing capabilities positively strengthen the effect of R&D investments on innovation performance (e.g., Ren, *et al.*, 2015). This study contributes to the empirical research, showing that the development of marketing and technological skills is an important way to achieve organizational innovation intensity and, therefore, to obtain a greater performance in the export market.

Another important finding is the importance of marketing capabilities in terms of their ability to influence innovation and performance, more than technological capabilities. In both high and low turbulence, the innovation effects of marketing capabilities are higher than the effects of technological capabilities. Moreover, the strength of the relationship between organizational innovation and export performance is greater in the technologically high turbulent environment.

Considering that the introduction of radical innovations is the key to survive in turbulent technological environments (Prahalad & Hamel, 1990), exporters must invest significant amounts of time and resources in marketing assets. Better marketing capabilities lead to greater organizational innovation intensity and help firms to achieve superior export performance. Likewise, in stable environments, marketing abilities still have a critical role in innovation and performance achievement of exporting companies. This emphasis on marketing is noteworthy, given the fact that many senior executives are reluctant to invest in marketing activities because they have difficulties to realize their importance in stimulating demand and generating revenues (O'Halloran, 2004). Nevertheless, the implementation of the inappropriate pricing or product strategy, the inadequate marketing communication or the poor inter-firm relationship with distributors, tend to lead to product failure (O'Cass & Weerawardena, 2010).

The findings point out for the relevance of marketing in innovation efforts and performance. However, this does not mean that technological capabilities are not important. Note that technological capabilities have a positive and significant influence on organizational innovation intensity. This means that without the ability to act on innovation intensity, technological capabilities will not affect performance. In this case,

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organizational innovation is the only path by which technological capabilities may lead to export performance.

This study contributes to the RBV, where has been argued that capabilities must be managed effectively to achieve a greater performance (Barney, 1991). Considering how technological and marketing capabilities can be effectively leveraged into innovation, it is possible to contribute to a better understanding of their performance implications. In addition, this study analyzes the impact of environmental turbulence on capabilities, focusing on different types of environmental turbulence and two different firm operational capabilities.

From a managerial perspective, this article helps practitioners to create a path for building market share in export markets. Exporters could enjoy superior performance both directly, by converting marketing capabilities into greater performance, and indirectly, by translating marketing and technological capabilities into performance via the bridging role of organizational innovation intensity. As such, a critical implication of the current study is that exporters should never stop developing marketing and technological capabilities. Marketing and technological capabilities are core capabilities and major drivers of export performance. They have synergistic effects and that is why firms must develop both capabilities (Ren, *et al.*, 2015). These capabilities enable firms to gain deeper insights into customers' needs, competitive behaviors, market trends and technological advances, and thus to increase the innovation needed to explore new business opportunities. Export managers should work together with the firm's marketing and R&D departments for the strongest innovation outcome possible.

From a governmental perspective, this study can help policy makers and potential exporters by driving government aids to develop suitable capabilities with major influence on organizational innovation intensity. By using the marketing and technological capabilities that are especially important for organizational innovation, the manufacturing exporters' best practices can be disseminated and, this way, the existing firms may benefit as well as those operating in similar contexts. If exporting is generally the first stage of the process of internationalization, then it is clear the importance of innovations by allowing companies to capture more value in the supply chain. The challenges related to foreign markets can be offset by a greater firms' ability to differentiate through several technological and non-technological innovations. So, it is important that governments and exporters devote a lot of attention to the development of innovations not only in terms of products and processes, but also in terms of management and marketing procedures.

In sum, the basic premise of this research is that performance differences in exporting manufacturers may include developing marketing and technological capabilities and apply them in the organizational innovation process. Marketing and technological capabilities become the foundation of innovation, which in turn affects firm success. The development of relevant marketing and technological capabilities should help exporting manufacturers to create the appropriate environment for the adoption of innovation, bringing distinctive competencies to the firms and give them competitive advantages to increase their earnings in international markets.

7. Limitations and future research

The findings of this study should be interpreted taking into account several limitations. First, more empirical effort should be allocated to the study of marketing capabilities. The focus of this study is on four specific export marketing capabilities based on the

previous work of Zou *et al.* (2003). We used a second-order construct, but other types of marketing capabilities and their effects on export performance may be considered for future research. For example, channel management, post-sale service and selling (e.g., Morgan, *et al.*, 2012), customer relationship management (e.g., Morgan *et al.*, 2009), and brand management (e.g., Trainor *et al.*, 2011).

The second limitation concerns the fact that a limited number of predictor variables were used. The model does not consider other possible factors as antecedents of marketing capabilities, technological capabilities, and organizational innovation intensity. These possible factors comprise market orientation (e.g., Murray, *et al.*, 2011; Ngo & O'Cass, 2012), learning orientation (e.g., O'Cass & Weerawardena, 2010), and entrepreneurial intensity (e.g., Weerawardena & O'Cass, 2004). In addition, other factors may influence firms' export performance and we do not claim that the model tested as part of this research is exhaustive in terms of variables that need to be measured when examining performance in export markets.

Another possible limitation is that the cross-sectional data used in this study may not be adequate in identifying fundamental relationships among the constructs. As such, cause-and-effect relationships may not be definitively inferred from the results. Longitudinal data may improve this type of investigation, analyzing how changes in marketing capabilities, technological capabilities, and organizational innovation intensity can affect export performance.

Moreover, the generalizability of results is another limitation in this research. Since only firms based in Portugal were surveyed, the findings may have limited generalizability to other countries. Future studies based on samples from various countries would be able to generalize the findings of the current research.

Finally, future studies should also explore the possibility of marketing capabilities moderating the relationship between organizational innovation intensity and export performance. While this study did not investigate marketing capabilities as a moderator, the impact of organizational innovation intensity on export performance could be enhanced or reduced by the level of marketing capabilities.

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Appendix

Measurement model results

Construct/items	Standardized loadings	t-value
Pricing capability (α=0.743, ρvc(n)=0.51, ρ=0.75) (adapted from Zou *et al.,* 2003)		
Scale: 1-strongly disagree; 5-strongly agree (relative to major export market competitors)		
1. We respond quickly to competitors' pricing tactics	0.84	17.52
2. We use pricing skills to respond quickly to any customer change	0.71	14.82
3. We communicate pricing structures and levels quickly to customers	0.57	11.83
Product development capability (α=0.838, ρvc(n)=0.58, ρ=0.85) (adapted from Zou *et al.,* 2003)		
Scale: 1-strongly disagree; 5-strongly agree (relative to major export market competitors)		
1. We develop new products for export to exploit R&D investment	0.68	16.01
2. We speedily develop and launch new products for export	0.80	20.01
3. We manage overall new product development systems for export market well	0.81	20.16
4. We successfully launch new products for exports	0.74	17.74
Communication capability (α=0.954, ρvc(n)=0.88, ρ=0.95) (adapted from Zou *et al.,* 2003)		
Scale: 1-strongly disagree; 5-strongly agree (relative to major export market competitors)		
1. We skillfully use marketing communications	0.90	25.10
2. We use marketing communication skills and processes well	0.98	29.35
3. We effectively manage marketing communication programs	0.92	26.22
Distribution capability (α=0.927, ρvc(n)=0.73, ρ=0.93) (adapted from Zou *et al.,* 2003)		
Scale: 1-strongly disagree; 5-strongly agree (relative to major export market competitors)		
1. We attract and retain the best distributors	0.74	18.38
2. We satisfy the needs of distributors	0.90	24.84
3. We add value to distributors' businesses	0.91	25.44
4. We are close in working with distributors/retailers	0.83	21.70
5. We provide high level of support to distributors	0.87	23.51
Technological capabilities (α=0.798, ρvc(n)=0.57, ρ=0.80) (adapted from Kyläheiko *et al.,* 2011)		
Scale: 1-strongly disagree; 5-strongly agree		
1. Our technological capabilities are top class	0.69	15.63
2. The success of our R&D activities is based on long-term know-how	0.69	15.83
3. We have invested heavily in certain R&D projects	0.87	21.24
Organizational innovation intensity (α=0.919, ρvc(n)=0.59, ρ=0.85) (adapted from Weerawardena, 2003)		
Scale: 1-limited; 5-extensive		
1. Product innovations introduced by our firm during the last three years have been	0.76	18.92
2. Process innovations introduced by our firm during the last three years have been	0.79	20.28
3. Managerial innovations introduced by our firm during the last three years have been	0.76	19.05
4. Marketing innovations introduced by your firm during the last three years have been	0.72	17.78
Scale: 1-incremental; 5-radical		
1. Product improvements have been mainly	0.77	19.55
2. Process innovations have been mainly	0.81	20.81
3. Managerial innovations have been mainly	0.80	20.31
4. Marketing innovations have been mainly	0.73	17.88
Export performance (α=0.894, ρvc(n)=0.69, ρ=0.90) (adapted from Morgan *et al.,* 2006)		
Scale: 1-much worse than competitors; 5-much better than competitors		
1. Export venture's market share growth	0.86	22.59
2. Growth in export venture sales revenue	0.92	25.03
3. Acquiring new export venture customers	0.76	18.96
4. Increasing sales to current export customers	0.76	18.98
Market turbulence (α=0.703, ρvc(n)=0.56, ρ=0.71) (adapted from Kaleka, 2012)		
Scale: 1-strongly disagree; 5-strongly agree		
1. Customers' product preferences change quite a bit over time	0.68	12.55
2. Our customers tend to look for a new product all the time	0.80	13.95
Technological turbulence (α=0.803, ρvc(n)=0.59, ρ=0.81) (adapted from Kaleka, 2012)		
Scale: 1-strongly disagree; 5-strongly agree		
1. The technology in our industry is changing rapidly	0.77	17.84
2. Technological changes provide big opportunities in our industry	0.79	18.40
3. A large number of new product ideas have been made possible through technological breakthroughs in our industry	0.73	16.72

α=internal reliability; ρvc(n)= variance extracted; ρ=composite reliability.