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RESEARCH PAPER

The Influence of Technology Orientation on Firm Performance: The Mediating Role of Dynamic Capabilities in a Dynamic Pharmaceutical Environment

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ABSTRACT

This study investigates how technology orientation influences firm performance through the mediating role of dynamic capabilities within Pakistan's dynamic pharmaceutical environment. Although the Resource-Based View and Dynamic Capabilities View highlight the importance of strategic resources, limited empirical work integrates technology orientation with capability development. Rapid technological shifts in pharmaceuticals make this linkage critical. A quantitative approach was used, drawing data from 180 pharmaceutical firms. Partial least squares structural equation modeling (PLS-SEM) evaluated direct, indirect, and moderating relationships among technology orientation, dynamic capabilities, firm performance, and environmental dynamism. Technology orientation significantly improves firm performance both directly and by strengthening sensing, seizing, and reconfiguring capabilities. Dynamic capabilities also show a strong positive impact on performance. Environmental dynamism, however, does not significantly moderate the dynamic capabilities–performance relationship. Pharmaceutical firms should invest in both technological advancement and capability-building systems. Future studies should adopt longitudinal designs and cross-industry or cross-national comparisons.

KEYWORDS Technology Orientation, Dynamic Capabilities, Environmental Dynamism, Firm Performance, Pharmaceutical Industry, Pakistan

Introduction

The contemporary business environment is extremely competitive, and businesses are always under the pressure to advance and sustain their performance (Lonial, Carter, 2015). In the Resource-Based View (RBV), (Barney, 1991), the organizations achieve sustained competitive advantage as a result of the use of valuable and rare, inimitable, and non-substitutable (VRIN) resources that enhance the overall performance (Wiklund and Shepherd, 2003). Strategic orientation is also perceived as one of the most crucial organizational resources (Menguc and Auh, 2006) in the study of business performance and business competitiveness. Most of the literature in the past has concentrated on the direct relationship between the strategic orientation and organizational performance (Appiah-Adu and Singh, 1998; Aloulou, 2018; Dibrell et al., 2011; Salavou, 2005). However, according to researchers (Lee et al., 2015; Zhou et al., 2005), the adoption of strategic orientations is insufficient to generate a better performance but the knowledge of how strategic orientations can create performance results is required.

Dynamic Capabilities View (DCV) is a variant of RBV related to the importance of adapting to the unstable environment (Helfat and Peteraf, 2003, 2007). The proponents

of DCV refute the reality that in order to retain organizational performance within a dynamic environment it is enough to have resources, which includes technological orientation (Eisenhardt and Martin, 2000; Teece et al., 1997). Teece (2007) states that in the fast evolving environment, companies have to continue reorganising their resource base to retain the long-run competitive advantage. Strategic orientation such as technological orientation is an important resource that can foster long term competitive advantage in case it is supported by dynamic capabilities, which involve sensing, seizing, and reconfiguring. The present paper assumes that dynamic capabilities are a significant channel of connecting technological orientation to firm performance. The opinion is supported by the earlier studies that are aimed at emphasizing that the strategic orientations incorporated in the decision-making activities of the firms generate dynamic capabilities of the firms (Zhou and Li, 2010). According to Teece (2007), the most important aspects of dynamic capabilities include opportunity recognition, opportunity exploitation and resource reconfiguration.

This research has prioritized the concept of technological orientation given the fact that it is applicable in long term success mostly in the pharmaceutical industry in Pakistan. Due to the dynamic environment that firms are operating in, this paper explains the moderating role of the environmental dynamism in the relationship between dynamic capabilities and firm performance. Although the presence of the notion of dynamic capabilities is becoming more popular, a significant proportion of existing research is theoretical (e.g., Eisenhardt and Martin, 2000; Griffith and Harvey, 2001; Helfat and Peteraf, 2007; King and Tucci, 2002; Makadok, 2001; Teece, 2007; Teece et al., 1997; Zollo and Winter, 2002). Thus, scanty empirical evidence remains regarding the relationship between the resources, dynamic capabilities and performance in dynamic environments that can be explained by Dynamic Capabilities View (DC V) (Wu, 2010). This paper can therefore contribute by bringing empirical literature in the body of knowledge through investigating the interaction between technological orientation (as a resource), dynamic capabilities and firm performance in dynamic environment.

A major contribution of the research is that it generalizes the RBV into the DCV in dynamic setting. The article empirically investigates the DCV by means of the mediating significance of dynamic capabilities amid technological orientation and the firm performance, and moderating significance of environmental dynamism amid dynamic capabilities and the firm performance. The research augments theoretical and practical information on the importance of technological orientation in the betterment of company performance through dynamic capabilities within a rapidly evolving environment.

The study has two study objectives. Firstly, it provides certain contextual background information regarding the pharmaceutical industry in Pakistan in which there is a lack of empirical research (Abro and Memon, 2011; Ahmad et al., 2013; Hussain et al., 2015; Khuwaja et al., 2017; Nadeem and Siddiqui, 2017). This research is more view inclusive than past empirical studies that usually focus either of these theoretical models. Second, the results present empirical concepts to the managers in pharmaceutical firms particularly in the context of the role of resource allocation and capability building towards sustainable performance in the dynamic environment.

In this paper, the transformation in RBV to DCV during the dynamic market situation is investigated based on survey data of 180 Pakistani pharmaceutical companies. Specifically, it empirically tests the following: (1) the direct effect of technological orientation on dynamic capabilities, (2) the direct effect of dynamic

capabilities on firm performance, (3) the direct effect of technological orientation on firm performance (by retesting RBV assumptions), (4) the mediating role of dynamic capabilities in the relationship between technological orientation and firm performance (in turn, retesting RBV assumptions), and (5) the moderating role of the environmental dynamism on the relationship between dynamic capabilities and firm performance.

The remainder of the paper has been structured in the following manner: The conceptual framework has been described with the theoretical background and research hypotheses. This is then followed by its methodology and measurement scales, data analysis processes and results. The discussion section then concludes with the findings which are interpreted and followed by the managerial implications. The paper concludes with limitations and recommendations of the future research.

Literature Review

Technology Orientation and Dynamic Capabilities

Each of the three aspects of dynamic capabilities sensing, seizing, reconfiguring are known as technology orientation. Citing the case in point, the historical experiences and activities of the technology-focused companies allow them to accumulate the significant volumes of technical knowledge, the essential features of which are intensive investment in the research and development of products and services, fast purchases of new advanced technologies, and obtaining the latest technologies information. This competency assists the firms to maximize their capabilities of creating technology-based and other differentiated products to respond to the changes in the environment (Gatignon and Xuereb, 1997), and it also enables the firms to recognize the new trends in technology and re-align their resources to take advantage of the trends (Zhou et al., 2005). The organizations capitalize on the opportunities by evaluating the existing and potential investments in the associated projects and technology (Teece, 2007). Various studies have indicated the positive correlation between technology orientation and dynamic competence (e.g., Kaehler et al., 2014; Zhou and Li, 2010).Technology orientation indicates the dedication of the firm to technological progression and innovation that has been known to have a positive impact on strategic positioning and performance levels (Hafeez et al., 2011).

Empirical studies are quite recent and they still confirm the fact that technology orientation is a significant antecedent of dynamic capabilities. One such area is the sensing and consequent seizing and transforming abilities of an emergent technology market, which is very likely anticipated by technology orientation (Zabel and O'Brien, 2024), and which has been suggested to be enhanced by digital orientation (Zhang et al., 2025). Dynamic capabilities include the capability of a firm to perceive opportunities and capture resources as well as reorganize internal structures to keep functioning in the dynamic environment (Hafeez, Rana, Chaudhry, Khan, Ahmad, and Rehman, 2011).

These new findings substantiate the theoretical assertion that technology oriented firms can be more probable to notice the opportunities, mobilize resources, and reorganize their operational foundation in dynamic environments.In this regard, technology orientation ought to enhance the aptitude of organizations to assume dynamic capabilities, by the capability to identify and capitalize on the opportunities and restructure their resource base. Following the discussion above, it is possible to make the following assumptions.

H1: Technology orientation has the significant impact on dynamic capabilities.

Dynamic Capabilities and Firm Performance

The organizations should identify and take advantage of opportunities and re-organize their capabilities and resources in line with the emerging technological requirements in order to maintain a competitive advantage (Teece, 2007) . Also, a case in point, a minor change in sense-making may ultimately lead to a corporation attaining a sustainable competitive advantage (Haeckel, 1999). Those companies with a higher sense can conduct proactive research and analysis to acquire more knowledge that can enhance the environmental understanding (Neill et al., 2007) so that they can know the technological needs, react promptly to technological projects and develop new products to enhance their performance (Li and Liu, 2014). The traditional resources and strategies are no longer effective as organizations transform their environment (external and internal) and ultimately weigh down organizations (Leonard-Barton, 1992). It implies that companies will be forced to reconfigure and reposition their resource base and redefine their business model by augmenting their experiences and capabilities, a valuable necessary move towards progress (Lavie, 2006). It is by revitalizing the current organizational strategies and pool of resources that organizations can align themselves with the shifting market trends (Newey and Zahra, 2009). Dynamic capabilities positively influence the performance of the firm in a variety of ways, including the ones that enable the firm to adapt to the market variability (Eisenhardt and Martin, 2000) and enhance inter-firm performance (Gudergan et al., 2012) as Teece et al. (1997) argued. Dynamic capacities will also enhance the performance of the firms rendering them more effective, faster, and competent in their response to the environmental dynamism (Chmielewski and Paladino, 2007).

However, the role of dynamic capabilities in theoretical and practical views of an organization as pertains to its competitive advantage in the dynamic and unpredictable environment has made this issue gain center stage in the scholars circles (Lampel and Shamsie, 2003; Lenox and King, 2004; Salvato, 2003; Zott, 2003). The multi-dimensional performance constructs are supported with self-esteem, fashion consciousness, and brand dynamics, which explain the impact of psychological orientations on outcome variables (Sehar, Hafeez, and Firdaus, 2025).

Combination of entrepreneurial orientation and AI adoption helps to show how strategic orientations can be transformed into the results of innovation (Hafeez, Shabbir, Gulbahar, and Mehmood, 2025).

The importance of dynamic capabilities of a corporation is clear in numerous aspects, such as the assurance that the company will be profitable in the long term (Teece, 2018).The literature on ethical leadership and role clarity also supports the mediation of the external and internal conditions on the performance outcomes (Raja, Hafeez, and Sehar, 2024).

The empirical study of the effect of dynamic skills on the performance of people has been examined in numerous works. Lin and Wu (2014) maintain that dynamic capabilities made a positive impact on the Taiwanese large corporations based on the ratio of a return to assets. It has been argued that dynamic talents have a positive influence on performance in an organization (Wilden et al., 2013). The differences between social and commercial entrepreneurs are strategic reasons asserting the

necessity to address orientation-based discrepancies in performance-related research (Hafeez and Raja, 2022).

The recent research has reinstated the place of dynamic capabilities in the sense making, capturing, and rearranging of resources that have been discovered to be core in the environments where volatility is a defining trait and the pace of technological change, in addition to change. To illustrate, the sensing, seizing, and reconfiguring capabilities have been discovered to be affected by strategic leadership and organizational learning to a greater extent (Bornay-Barrachina et al., 2025). In the same way, sensemaking has been found to influence seizing and transforming capabilities, the transforming capabilities of which have a positive influence on innovation and firm performance (Zabel and O'Brien, 2024). The performative perspective also highlights the nature that the sense, grasp and transform ability is the outcome of pursued social interactions particularly within the SMEs (Engelmann, 2024). In addition, recent longitudinal evidence indicated that the deployment of dynamic capabilities is also distinct with respect to both incremental and radical innovation of business models in dynamic situations (Schuelting, 2025). These extensions to the Teece contributions are supposed to justified the conventional contributions to the subject matter and justify consistency and evolution of the utility of the framework of dynamic capabilities to the competitive advantage (Cavusgil and Deligonul, 2024; Teece, 2025). It is why the hypothesis below is formulated:

H2**:** Dynamic capabilities have the significant impact on firm performance.

Relationship between Technology Orientation and the Firm Performance

Researchers believe that technology orientation is a precursor of improved performance to a large extent (Kohli and Jaworski, 1990; Narver and Slater, 1990). Strategic positioning of the firm makes the firm to make profits and compete effectively (Harrison-Walker, 2001). In the past, the significant role of technology orientation has been emphasized (e.g. Chin et al. 2013; Gatignon and Xuereb, 1997; Narver and Slater, 1990; ODwyer and Gilmore, 2019). The role of macro-strategic changes and national programs (e.g., CPEC) in influencing the development of an organization justifies the relevance of the environmental and strategic variables in the context (Hafeez, Raja, Gulbahar, and Tahir, 2024).

One of the most important factors in the process of development of new products, procedures, and services is technological know-how of an organization. Technology strategy displays the creative direction and the commitment to innovations in an organization (Wilson et al., 1999). The technology and innovation strategy determines the competence ability of a firm to attain competitive advantage (Hitt et al., 1990). Companies that invest heavily to acquire advanced technology are more innovative since new products are produced using the technology and to satisfy the needs of the clients (Cooper, 1994). Ethical climate and its influence on work behavior will offer more extensive support to the capability-based organizational performance (Gulbahar, Hafeez, and Tahir, 2023).

The technological orientation that influences the ability of the firm to innovate is regarded as a significant source of the competitive advantage that is believed to result in the enhanced business performance (Voss and Voss, 2000). According to the studies, technology orientation is positively related to the success of the company (e.g., Aloulou, 2018; Gao et al., 2007; Gatignon and Xuereb, 1997; Masa'deh et al., 2018; Mu and Di

Benedetto, 2011; Salavou, 2005). Conversely, past research indicates that technology orientation is not associated with the performance of the firm (e.g., Burgelman and Sayles, 1986; Kanter, 1988). Age of the firm is also taken as a control variable because the older firms tend to develop routines, experience, and legacy systems which can influence the behavior and performance results (Rafi, Ahsan, Saboor, Hafeez, and Usman, 2011).

Amidst their problems, the above argument fosters an impression of the positive correlation between the technology orientation and corporate performance. The size of the firm is regulated due to the fact that larger companies usually have more resources and structural benefits that are capable of affecting the capacity of innovation and strategic performance (Shabbir, Hafeez,Gulbahar and Fraz, 2025).

The scholars continue to reiterate that strategic orientation is one of the major determinants of firm performance that are bolstered by the recent findings that the market, learning, and entrepreneurial orientations have a direct and indirect impact on performance achieved by innovation (Reyes Gómez, López, and Rialp, 2024). Prejudices in the hiring procedure and the organizational justice systems emphasize the situational elements shaping the results of firms and their planning procedures (Sehar, Hafeez, Raja, Rafiq, and Akram, 2023).

Similarly, existing research confirms that firms with high strategic orientations, particularly technology orientation, are providing high growth and competitive advantages due to their ability to permit more successful innovation and allocation of resources (Njoroge and Kinyua, 2025) .Performance of the firm indicates financial, operational, and strategic results that an organization attains due to its strategic orientations and processes that build the capability (Mehmood, Hafeez, Hussain, Chaudhry, and Rehman, 2011).

Using this argument, technological/digital orientation is a source of innovation and performance: digital orientation positively adds to the performance of the innovation using the digital sensing, integrative, and transforming abilities, where the effects are reinforced by environmental dynamism (Zhang, Wang, Luo, Guo and Wang, 2025); and, in collaboration with the technology opportunism and change orientation, it positively adds to the operation performance using the absorptive capacity (Lin and Chen, 2025). All these new pieces of research imply the conclusion that the technology orientation impacts the corporate outcomes positively and significantly, improves the innovation chain and competitive positioning.

H3: Technology orientation has the significant impact on the firm performance.

Mediating Role of Dynamic Capabilities

Resource-Based View (RBV) presupposes that strategic direction is one of the valuable resources (Menguc and Auh 2006). The enterprises must reorganize their resources to become competitive according to the DCV (Teece, 2007). Therefore, strategic orientation as it is valued, rare, inimitable, and non-substitutable (VRIN) can solely serve as a source of competitive advantage when it is combined with dynamic capabilities of sensing, seizing, and reconfiguring competencies. The lack of these competencies may turn the organizations incapable of restructuring their resource base to respond to changing market requirements to be competitive. It is also found recently that strategic orientation does not always directly influence but moderates it through other variables in order to increase performance-based performance, such as innovation performance

(Lee et al., 2015) and strategic capabilities (Hao and Song, 2016). Wu (2007) explained that the dynamic capabilities can be discussed as the mediated variable between the performance and resources of a company. Dynamic capacities can then be regarded as a transformative force that can restructure the resources of the firm to achieve improved performance (Protogerou et al., 2011). Wilden et al. (2013) claimed that the indirect positive effect of dynamic capabilities on organizational performance was achieved in the shape of organization, extension and change of resource base of the firm. The study by the foregoing simply indicates that strategic orientation is influential on the firms performance as it influences dynamic capabilities. The hypothesis developed by Zhou et al. (2005) is that strategic orientation is the process of generating particular responses that will subsequently influence the company performance. The underlying idea in this new study is the motivation of the strategic orientation implementation in the formation of dynamic capabilities that subsequently result in the enhancement of business performance: recent evidence on such mediated relationship on strategic orientations and innovation capabilities have a significant impact on strategic renewal and therefore on competitive advantage (Larabi, 2025). Also, it was found out that the mediating variables between strategic agility and performance are market orientation and innovation capabilities, which demonstrate the importance of strategic dynamism in providing high-quality outcomes (Alkandi and Helmi, 2024). All these findings contribute to support the hypothesis that strategic orientation enhances business performance primarily because it affects and enables the formation of dynamic capabilities, which in turn when combined with dynamic capabilities can eventually lead to business performance (as earlier stated) (Zhou et al., 2005). The following hypothesis is based on above arguments and is derived in this research.

H4: Dynamic capabilities mediate the relationship between technology orientation and firm performance.

Moderating Role of Environmental Dynamism

Previous studies have indicated that organizations require dynamic competencies to assist in inculcation of success. Dynamic capabilities enable organizations to recognize the opportunities and reorganization of resources, giving them a brand new strategic orientation and this enhances their probability of success (Eisenhardt and Martin, 2000; Teece, 2007). Positive relationship between the performance outcomes and the dynamic capacities has been proved by empirical studies (e.g., Fainshmidt et al., 2016; Pezeshkan et al., 2016). However, the circumstances in which such positively good results could be attained remain rather ambiguous (Jantunen et al., 2018). Teece et al. (1997) argue that the contribution of the dynamic skills to the enhanced performance of the firm depends upon the environment in which the organization operates. The environmental dynamism will be used to measure the degree of variability and uncertainty in external factors that determine how companies change and maintain their performance in the face of competitive changes (Hafeez, Raja, and Sehar, 2023).

In support of this argument, it is factual that any efforts made by the firm to embrace dynamic capabilities will be detrimental in a relatively stable environment that is characterized by homogenous customer needs, competition, and technological dynamics (Schreyog 2007, and Eberl, 2007), and thus, a negative correlation will be expected between dynamic capabilities and competence within firms (Li and Liu, 2014). Conversely, the dynamics make the existing capabilities less valuable in a case where the environment in which a firm is operating is uncertain in terms of the technology

requirements, innovations, the stiff competition with technologies and the short-term nature of the opportunities, compelling the firm to bear the apparent and frequent changes. Such situations require dynamic capabilities.

Furthermore, Li and Liu (2014) asserted that in a stable environment, current operational capabilities suffice to adjust to market forces such as satisfying consumer demands and generating profits as well as keeping competitive edge and hence, reduced significance of dynamic capabilities. This argument is validated by the empirical evidence presented by Drnevich and Kriauciunas (2011), and Wu (2010), who have stated that there is no significant correlation between dynamic capabilities and performance of the firm that would exist in a relatively stable environment but in an environment where there is volatility there exists a positive correlation between the two variables and indicates the moderating influence of the environmental volatility. The results of Schilke (2014) and Li and Liu (2014) determined the relative moderating effect of environmental dynamism on the effect of dynamic capabilities and competitive advantage. The correlation between dynamic capabilities and business performance has not been able to be demonstrated in some of the literature studies due to environmental dynamism moderation. Incidentally, Ringov (2017) found no significant energy between the moderator of environmental dynamism and the interdependence of the codified dynamic capabilities with the business performance. The relationship between reconfigurations and economic success could not identify the relationship of the environmental dynamism as indicated by Girod and Whittington (2017).

It has been revealed in the past that promotion of organizational success and the capacity to recognize and restructure resources require dynamic competencies that provide strategic positioning that enhances the probability of success (Eisenhardt and Martin, 2000; Teece, 2007). Empirical research still supports positive relationships between dynamic capabilities and performance, and such effects are achieved through chains of capabilities and innovation outcomes (e.g., Zabel and O'Brien, 2024; Zhang, Wang, Luo, Guo, and Wang, 2025). The conditions under which these benefits become a reality, however, are indirect, as recent studies reinterpret the fact that the impact of dynamic capabilities is tightly linked to the external environment and its turbulence (Cristofaro, Helfat, and Teece, 2025; Bornay Barrachina, Lopez Cabrales, and Salas Vallina, 2025). In line with Teece et al. (1997), the existing evidence suggests that the contribution of dynamic capabilities to performance depends, namely, dynamic capabilities are central in more volatile environments that are typified by changing technologies, intense rivalry, and temporary opportunities: in more stable environments, their peripheral value can decrease relative to the common (operational) capabilities (Kwiotkowska, 2024).

By this contingency logic, in recent studies, it is documented that environmental dynamism moderates the capability-outcome relationship, i.e., the impact of digital orientation on innovation performance is positive when based on digital sensing/integrative/transforming capabilities and the influence is enhanced with the increase of environmental dynamism; more generally, sensing, seizing, and transforming capabilities have different impacts on business model innovation over time with the fluctuation of environmental conditions (Schuelting, 2025; Zhang et al., 2025). At the same time, mixed findings are also present, indicating the presence of the past null findings concerning moderation: even in literature, the significant moderating effect of environmental dynamism on some links of dynamic capabilities and performance (e.g., the inadequacy of single conditions or the inability of translation of reconfigurations into economic gains) can still be observed (Kwiotkowska, 2024). Overall, the new evidence

confirms the thesis that in the context of high dynamism, dynamic capabilities are the most relevant to be described, and they are often indirect in nature, made by the processes of innovation, transformation, and renewal, which allows explaining why the earlier research found quite insignificant or even negative correlations in more stable settings (Cristofaro et al., 2025; Zabel and O'Brien, 2024). Nonetheless, according to the arguments made above, this paper sets the following hypothesis:

H5: Environmental dynamism moderates the positive relationship between dynamic capabilities and firm performance. Specifically, the positive relationship between dynamic capabilities and firm performance will be stronger (weaker) when environmental dynamism is high (low).

Material and Methods

Context of the Research, Sample, and Procedure

Pakistan pharmaceutical industry is a dynamic one, and it has been observed that its market size is 3.2 billion dollars, and locally based firms mostly have to compete in the industry, thus creating the environment of a very high competition. This industry has a growth rate of 15 percent per year because of the high rate of investment in the marketing and production technology. The past decade has been a period of tremendous transformation in this industry in terms of delivering vital healthcare products to the people, as well as the upsurge in the consumption of pharmaceuticals (Pakistan Pharmaceutical Industry, 2017). The external environment is characterized by high frequency and unpredictability and puts pharmaceutical enterprises into the problem of enhancing their competitiveness. In an effort to deal with this issue, several scholars propose that companies must use their dynamic capabilities to transform and rejuvenate their resource base in response to the fast-evolving environment (Zhou and Li, 2010). Organisations can more easily develop the dynamic skills internally as opposed to purchasing them in the market through market transactions (Zhou and Li, 2010). Thus, the foregoing data indicate that the Pakistani pharmaceutical sector will be an appropriate backdrop of the study since the companies in this area are operating in a dynamic environment. The best performing executives in this industry should then integrate a certain technological focus and dynamic competencies to enhance the performance of the firm in the highly fluctuating environment. Pakistan has 627 pharmaceutical companies spread all over (Drug Regulatory Authority of Pakistan, 2017). The study based population was 612 local enterprises and it was not a coverage of 15 international firms in the industry. Simple random choice was used by the researcher to invite 242 companies to take part in the research. The growth was within the parameters provided by Krejcie and Morgan (1970). This paper is based on the unit of analysis, the firm, and the information gathered is a group of senior managers. Central sources of information are chosen based on the ideas and values that shape the strategic decision-making of the firms (Covin and Slevin, 1990), making them the appropriate sources of information regarding the strategies of their companies (Kumar et al., 1993). A different version of the general design procedure was conducted to raise the rate of response (Dillman, 2007). The survey was mailed to all the respondents in a folder containing cover letter, survey and prepaid return envelope. This method of extrapolation which was employed in the process of administering the survey was referred to as the successive waves (Armstrong and Overton, 1977). The data was gathered within the three-month period (August 2017 to November 2017). The reminders were sent to the non-respondents three weeks later after the initial release of the 242 survey questionnaire along with introductory letters. The survey questionnaires

submitted up to the survey time were 35, out of which 180 could be usable and complete and the average response rate of the survey was about 74.3 percent. We had n=180, which was enough to analyze the information as we were sure we made significant analyses considering the 10 times rule (Barclay et al., 1995).

Measures

All of the constructs were measured using a 7-point Likert scale, with anchors as low as 1 = strongly disagree and as high as 7 = strongly agree. Salavou et al. (2004) developed a five-item scale that was used in the technology orientation assessment. Among such statements is, we have invested more on the development of new products than is the case with most firms in our industry. A scale of twelve items that Fainshmidt and Frazier (2016) created to measure dynamic capabilities comprising the three first-order constructs, specifically sensing, seizing, and reconfiguring, was used to measure dynamic capabilities. The examples of the items of the corresponding sub-scales are, We change our marketing methods or strategies on a regular basis, We react to the errors detected by the staff, and We adhere to the best practices in the industry. The environmental dynamism scale was measured on a four-item scale which was created by Li and Liu (2014). One of them is the statement, we live in fast-developing technology in our industry. Lastly, subjective performance measure was used to gauge performance of the business. Multi-company sample used in this study meant that there was need to balance the performance disparity of the firms by considering the relative performance measure like profitability, growth and the market share (Keskin, 2006). They were measured in terms of financial and non-financial measures in order to provide the anonymity (Avci et al., 2011). The five-item scale was used to measure firm performance based on Al-Ansaari et al. (2015). They were measured on a 7-point Likert scale and the 1-7 scale implied that the company performance is significantly lower than the performance of other businesses in the business field and 7, respectively, significantly better. The sales growth of our firm is one of the examples. These control variables were the company size and age to account the potential effects of the two variables on the company performance (Hsu and Wang, 2012). The firm size aspect was gauged using one of the commonly applied measures viz. the number of employees (Kimberly, 1976). Measuring of the age of the firm was on the number of years since it was established (Heunks, 1998).

Data Analysis

The measurement model and structural model were tested with the help of partial least squares (PLS), which is SmartPLS version 3.2.7(Ringle et al., 2015). PLS possesses some characteristics that makes it suitable in our study which include its permissive distribution assumption, its capability to possess a hierarchical component structure and its capability to accommodate the complex model (Chin, 2010). Bootstrapping was used (1,000 resamples) to acquire the standard errors and t-statistics of the significance of the path coefficients. The second-order construct of dynamic capabilities was measured through the aid of the repeated indicators approach (Wetzels et al., 2009).

Results and Discussion

Common Method Variance

The common method bias was explored using the latent methods factor test that lacks measurement (Podsakoff et al., 2012). A common method variance factor was

included that included all the indicators of the main constructs and defines how much the variation of each indicator could be explained by its main construct (i.e. substantive variance factor) and the common method variance factor. The results showed that of 29 loadings of method factors, only 27 were not significant and indicators substantive variances were significantly high in comparison to method variances. Thus, common method bias was not quite a significant problem when addressing the data.

Evaluation of the Measurement Model

The confirmatory factor analysis (CFA) was also conducted to test the measures with a view of assessing the reliability, convergent, and the discriminant validities of the scales. All alpha coefficient, CR estimates and average variance extracted (AVE) were larger than their threshold of 0.7, 0.7 and 0.5 respectively (Hair et al. 2016). To test convergent validity, loading these items on the concerned constructs was tested. It is no exception that all the item loadings were beyond the cut-off point of 0.7, with one exception being a firm performance scale (0.670) item, but included in the further analysis since the AVE of firm performance was greater than 0.5. As it has been stated above, dynamic capabilities was developed as second order reflective construct. It was found that CR and AVE of dynamic capabilities equaled to 0.907 and 0.765 respectively and this is a testament to high-second-order construct. Besides, none of the loadings of the second-order construct in the first-order constructs was found to be significantly valued at p = 0.01 (see Figure 1).

Fornell and Larcker (1981) criterion was used to assess discriminant validity. Both square root of AVE values of these scales were also higher than the relationship of construct with all other constructs (see Table 1). The above combination yielded support to convergent and discriminate validity.

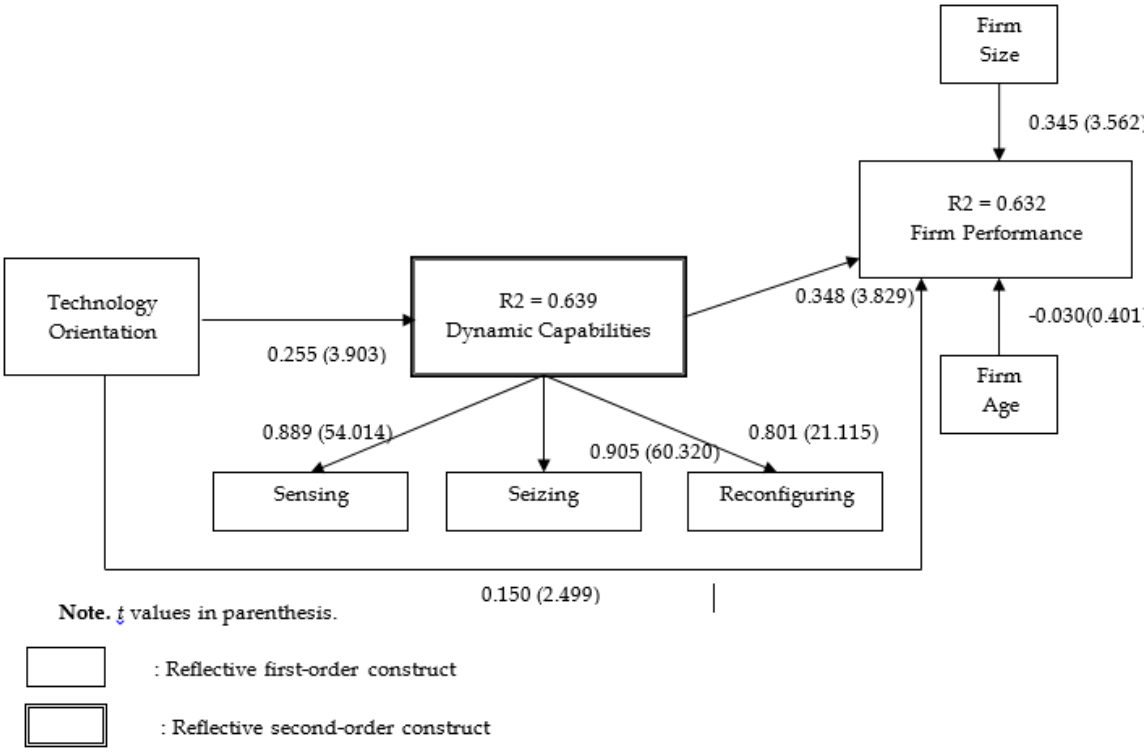

Fig 1. Main Effects Model

Table 1
Means, Standard Deviations, and Standard Deviations among Constructs

Construct	M	SD	1	2	3	4	5	6	7	8
1. Firm Size	4.83	1.63	**NA**							
2. Firm Age	4.77	1.61	0.521	**NA**						
3. Technology Orientation	6.21	0.82	-0.013	-0.040	**0.850***					
4. Dynamic Capabilities	5.93	0.74	-0.054	-0.054	0.603	0.684	0.605	**0.697***		
5. Environmental Dynamism	5.54	0.790	-0.127	-0.042	0.259	0.274	0.205	0.391	**0.910***	
6. Firm Performance	5.59	0.87	0.324	0.285	0.533	0.607	0.568	0.709	0.258	**0.728***

Note. The square root of AVE values on the diagonal (in bold).

Evaluation of the Structural Model

R2 is another assessment metric that was used in measuring the model fit of the proposed structural model. The value of the dynamic capabilities was 0.639 as it was drawn in Figure 1 suggesting that the outcome variable was the variance by 63.9 percent. The performance of the firm on the other hand had a R2 of 0.634. The results were synthesized to show an appropriate and adequate model. The bootstrapping resampling analysis results made it possible to find that the path coefficients between dynamic capabilities and technology orientation (= 0.255; = 4.090; = 0.01), technology orientation (= 0.460; = 8.030; = 0.01), and technology orientation (= 0.283; = 4.902; = 0.01) are statistically significant, H1a, H1b, and H1c, were accepted. In the same way, it was witnessed that dynamic capabilities also had significant relationships with firm performance (= 0.348; t = 3.902; p < 0.01) which supported H2. Similarly, the technology orientation (0.150; t = 2.587; p = 0.01), technology orientation (0.194; t = 2.798; p = 0.01), technology orientation (0.186; t = 3.058; p = 0.01) were found to be relatively positive in their contribution to the firm performance and supported H3a, H3b and H3c. The outcome of the control variables revealed that a strong positive impact of the firm size on the firm performance was present, as well as the weak impact of the firm age (see Figure 1). In order to test Stone-Geisser (Geisser, 1974; Stone, 1974) blindfolding test (omission distance = 7) were ranked to prove that, the endogenous latent variables yielded greater values of Q2 than 0 that indicates the predictive significance is high (Henseler et al., 2009).

The attachment of the importance of the indirect effects was made through the application of the bootstrapping method (Preacher and Hayes, 2004). The findings revealed the mediating roles of dynamic capabilities to the relationship between technology orientation and firm performance, technology orientation and firm performance and technology orientation and firm performance with the point estimates of 0.089, 0.160, and 0.099 respectively. Since 0.037; 0.155), 0.063; 0.246 and 0.036; 0.177 95% bias corrected confidence intervals of technology orientation, technology orientation, and technology orientation respectively, do not contain 0, then the conclusion was that there was no significant difference between the indirect effects of 0.05. H4a, H4b and H4c were hence upheld. Lastly, the relevance of environmental dynamism that moderate the relationships between dynamic capabilities and firm performance was determined through the assistance of PLS product indicator approach (Chin et al., 2003). Similar bootstrap was accomplished as in Chin (2010) with the perspective of coming up with the significance of the interaction effect. The interaction construct path coefficient of 0.094 showed that the interaction construct was not significant at p =0.05 (t =0.919) as the

resamples of 1,000 indicated (see Figure 2). In this respect, the Hypothesis 5 was not proved.

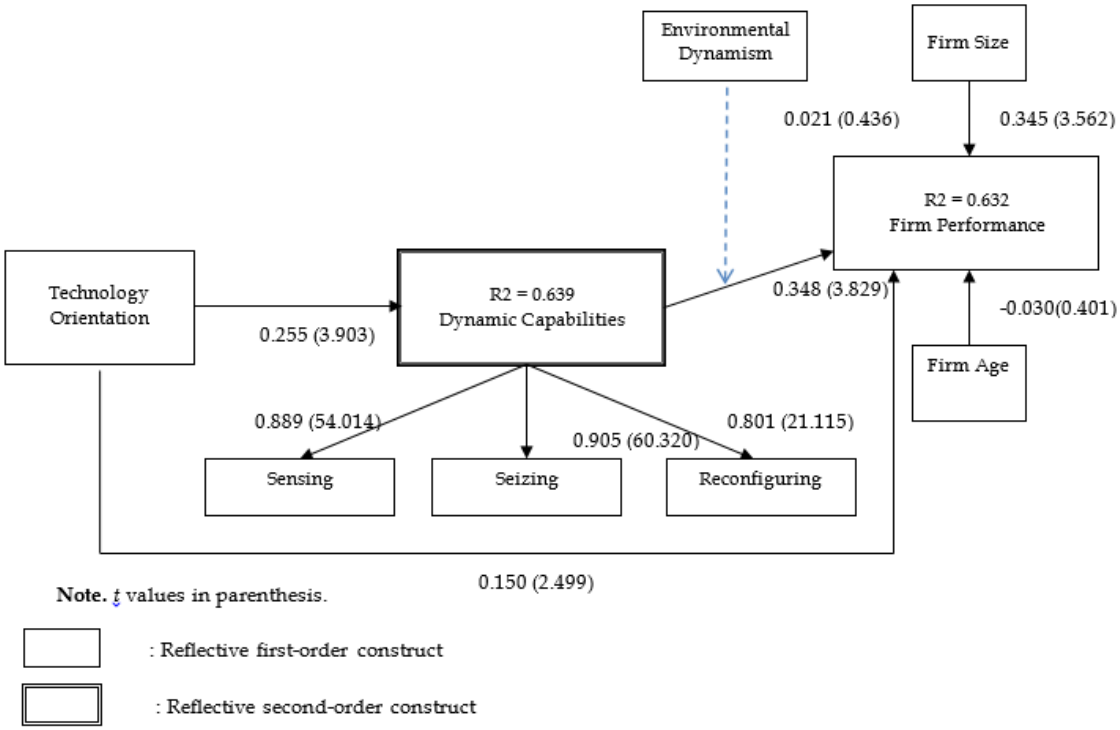

Fig 2. Interaction Effect Model

Discussion

This research was aimed at investigating the effect of technology orientation on the performance of firms by building dynamic capabilities and the effect of environmental dynamism on the relationship between the two in the pharmaceutical industry in Pakistan. The results provide three areas of significant theoretical and practical insights.

First, the research establishes that the level of technology orientation is an important source of dynamic capabilities. Companies practicing an active approach to technology and keeping track of the latest tendencies in the field as well as incorporating innovative systems are in a better position to feel the opportunities, grab innovations, and reorganize the resource base. The findings strengthen the previous studies that imply that the technology-oriented companies have unique knowledge and routines that constitute the basis of dynamic capabilities (Zhou and Li, 2010; Kaehler et al., 2014). This means that technology orientation does not only act as a strategic resource but as an enabler of capability building in vibrant markets.

Second, dynamic capabilities were identified to have a strong positive influence on the performance of a firm. This is consistent with extensive body of knowledge that suggests sensing, seizing, and reconfiguring capabilities to make organizations responsive, innovative, and competitive (Teece, 2007; Lin and Wu, 2014; Wilden et al., 2013). Within the framework of the Pakistani pharmaceutical industry, marked by a fast-paced technological change and a strong competition rate, organizations that can modify and re-arrange resources seem to be in a better position to deliver greater performance.

Third, the findings validate the hypothesis that technology orientation is directly related to performance, albeit they are not significant. This confirms the opinion that strategic positioning and responsiveness of firms to market shifts are stimulated by technological investments and innovation-based strategies (Appiah-Adu and Singh, 1998; Hilman and Kaliappen, 2014). Nevertheless, the indirect influence of technology orientation through dynamic capabilities was also more pronounced implying that technology does not in itself ensure performance unless companies also establish internal mechanisms through which technological knowledge is transformed into action.

Fourth, dynamic capabilities were revealed to mediate the correlation between technology orientation and performance of firms. This gives empirical evidence to the Dynamic Capabilities View that states that the mobilization and reconfigurations of resources through dynamic processes are needed to generate performance benefits (Teece et al., 1997; Zahra et al., 2006). Therefore, technology orientation is best appreciated when it is entrenched in robust sensing, seizing and reconfiguring processes.

Lastly, there was no moderating effect of environmental dynamism on the relationship between dynamic capabilities and performance as it was hypothesized to be. This finding indicates that dynamic capabilities are relevant to performance in spite of turbulence in the environment. The first explanation is that pharmaceutical companies in Pakistan have to work under a constantly changing environment, and dynamic capabilities can be considered universal. This observation is similar to those in other previous studies which found weak or non-significant moderation effects when using stable or semi-stable setups (Li and Liu, 2014; Ringov, 2017).

Conclusion

This study adds to the development of the concept of RBV and DCV by illustrating that the technology orientation as one of the strategic resources can lead to dynamic development of the capability which in turn leads to better performance of the firm. The findings indicate that the impact of technology orientation on performance is both direct and indirect, and the dynamic capabilities are the key mechanism by which technological investments are transformed into success of an organization. The research offers strong empirical evidence to the view that companies need to have valuable resources, and also constantly renew these resources, reconfigure and exploit them so as to maintain competitive edge in dynamic markets.

There are significant managerial implications of the findings. The pharmaceutical companies need to focus on the technological investments as well as on the creation of organizational processes that will enhance their capacity to detect trends, exploit opportunities, and reorganize resources. Dynamic capabilities ought to be considered as a long-term strategic asset, which is necessary to attain sustainable performance despite the fluctuation of the environment.

Even though environmental dynamism failed to moderate the dynamic capabilities performance relationship, it indicates that dynamic capabilities are even useful in moderately stable environments. Nonetheless, this finding suggests that future studies are necessary to understand the issue of contextual factors in more detail.

Conclusively, the research paper can contribute to the literature of strategic management by explaining the interaction between technology orientation and dynamic capabilities to promote firm performance. It also creates opportunities to other future

studies that will involve other strategic orientations, longitudinal designs, intercountry comparisons, and an industry with different levels of technological intensity. These extensions will also enhance the knowledge in the ways firms can remain competitive in dynamic environments.

Theoretical Implications

The study has a great contribution to the theoretical knowledge on the effect of technology orientation on firm performance. Even though previous literature recognises technology orientation as a source of competitive advantage, it was not clear as to how this orientation functions to improve the performance. This paper comes up with proof that dynamic capabilities that sense, seize as well as reconfigure are the mediating variable between technology orientation and firm performance.

The role as a mediator gives the study a contribution to the strategic management theory because it illustrates that the technology orientation alone does not suffice but its effectiveness is achieved when the companies create and implement the dynamic capabilities. The results also support the idea that the strategic orientations are complementary to enhance the performance, which is similar to Theodosiou et al. (2012) who conclude that various orientations contribute to the performance of a firm.

In addition, the study contributes to the theoretical discussion by positioning technology orientation as a strategic capability, which should be operationalized using dynamic capabilities in order to deliver performance results. The study however acknowledges its theoretical weaknesses since it is only based on technology orientation and does not assess other strategic orientations that are significant in strategy including entrepreneurial, learning and market/selling orientations, which can be incorporated in further research.

Practical Implications

The research provides a number of practical lessons on managers and practitioners, particularly in the pharmaceutical industry. First, the results indicate that companies need to be eager to build dynamic capabilities in order to convert technology-based strategies into enhanced performance. It underscores the importance of managers investing in the processes that will enable them detect the technological changes, capture the emerging opportunities and rearrange the resources to meet them.

In the case of pharmaceutical companies, technology orientation must be incorporated in strategic planning as it improves the responsiveness to the changing technological needs and is directly related to the firm performance. The managers are reminded that a majority of the well-planned strategies fail because they are not properly implemented; thus, they should invest in technology as well as dynamic capability which are bound to give high returns.

The findings also reveal that the development of dynamic capability in creating an environment where technology orientation can be achieved should be the priority of senior management, particularly in marketing and competitive positioning. Through the integration of technology-oriented strategies, as well as high dynamic capabilities, companies will be able to respond to change in the market more efficiently, innovate, and retain high performance levels.

Limitations and Future Research Directions.

Although it bears useful information, this study has limitations, which present good research areas in future studies. To begin with, the research narrows down on the mediating nature of dynamic capabilities; sensing, seizing and reconfiguring in the correlation between technology orientation and the performance of firms. There were other strategic orientations that were not involved, like, entrepreneurial strategic orientation, learning strategic orientation and selling strategic orientation. Other strategic orientations need to be included in future research to come up with a more holistic view of the interaction of different orientations to influence dynamic capabilities and organizational performance.

Second, the method of conducting the research is cross-sectional, where the data are collected at a given time. Whereas this method comes in handy to determine association, it restricts the possibility to conclude the causality relationship, as well as it does not provide the observation of the results of the development of technology orientation and dynamic capabilities. Longitudinal design would also allow the researchers to study changes through time and to give greater understanding on the dynamicness of these constructs.

The other limitation is associated with the aspect of environmental dynamism. In this research, moderating effect of environmental dynamism between dynamic capabilities and firm performance could not be significantly found. The relationship between environmental dynamism and capability-performance might be expanded in future studies, with possible measures being the alternative measurements of environmental dynamism or other situational variables that might confound the relationship between capability and performance.

Moreover, the study was only carried out in Pakistan. The findings may not be as generalizable even though various developing countries in other regions like the Middle East, Asia, and Africa are similar in terms of the economic and industrial environment. Comparative studies between various nations would also be useful in validating or disputing the research findings in other institutional, cultural, and market settings.

Lastly, the research was limited to pharmaceutical companies. Although the pharmaceutical industry offers an appropriate setting, owing to its high intensity of technological level, the results might not be applicable to other industries with various degrees of technological improvement or market forces. The model should be tested on various industries in future to increase the level of generalizability of the findings.

In spite of these shortcomings, the study makes a contribution to the expansion of the Resource-Based View (RBV) to the Dynamic Capabilities View (DCV) by illustrating how technology orientation leads to the enhancement of dynamic capabilities that, in turn, affect the level of firm performances. The results indicate that technology orientation improves dynamic capabilities and has both a direct and indirect impact on the performance. Even though environmental dynamism failed to dampen the relationship between dynamic capabilities and firm performance, the study has contributed to the literature on strategic management by explaining how technology orientation and dynamic capabilities interact to enhance the organizational performance.

Recommendations

Based on the findings of this study, several actionable recommendations are proposed for managers, policymakers, and future researchers:

- **Strengthen Technology Investments with Capability-Building Mechanisms:** Pharmaceutical firms should not rely solely on acquiring advanced technologies; rather, they must simultaneously invest in developing strong sensing, seizing, and reconfiguring capabilities. This dual focus will ensure that technological assets are effectively translated into sustained performance gains.
- **Institutionalize Dynamic Capability Processes:** Organizations should embed continuous environmental scanning, rapid decision-making structures, and flexible resource reallocation mechanisms within their strategic and operational routines. Formalizing these capabilities will help firms remain competitive even in conditions of persistent environmental turbulence.
- **Develop Capability-Oriented Training and Knowledge Systems:** Managers should introduce training programs, cross-functional learning platforms, and knowledge-sharing systems that enhance employees' ability to detect technological trends, exploit emerging opportunities, and support strategic reconfigurations.
- **Adopt a Holistic Strategic Orientation Portfolio:** Since technology orientation interacts with capability-building to affect firm performance, organizations should strengthen complementary strategic orientations such as entrepreneurial, learning, and market orientations to foster more comprehensive performance outcomes.
- **Encourage Industry-Level Support and Policy Frameworks:** Regulatory bodies and policymakers in Pakistan should promote industry-wide initiatives that enable technological upgrading and capability development, such as innovation grants, R&D incentives, and collaborative research platforms.
- **Future Research Extensions:** Subsequent studies should explore longitudinal designs to assess how technology orientation and dynamic capabilities evolve over time. Comparative studies across industries and national contexts are also recommended to improve the generalizability of the findings and refine the moderating mechanisms of environmental dynamism.

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