Knowledge-Based Dynamic Capabilities: A New Perspective for Achieving Global Competitiveness in IT Sector

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Abstract

The study aims to posit an edifice to the existing strategic management literature by proposing an alternate view of Knowledge-Based Dynamic Capabilities. The inter-alia suggests that when Knowledge Process Capabilities are leveraged to generate Higher-order Dynamic Capabilities, the resultant Knowledge-Based Dynamic Capabilities have a greater potential to generate competitive advantage for a firm in comparison to employing Knowledge Process Capabilities or Dynamic Capabilities in isolation. The paper makes an attempt to carry out an exhaustive review of literature and to further build upon the existing literature by empirically proving as well as suggesting that organizations need to build both the base level and higher-order capabilities in the pursuit of global competitiveness.

Keywords: Competitive Advantage, Knowledge-Based View, Dynamic Capabilities, Knowledge Process Capabilities

Introduction

The global Information Technology industry offers immense opportunities for industry players owing to increased IT spending in sectors like healthcare, transportation, retail, etc. The global market for IT industry is expected to reach an estimated value of US $1,147 billion by the year 2017 with a Compound Annual Growth Rate (CAGR) of around 5 per cent in a span of five years ranging from 2012 to 2017 (Luncitel, 2012). Global Outsourcing sites like India, Vietnam, China and the Philippines are pivotal to the global industry as they provide skilful and relatively inexpensive manpower to the industry (Luncitel, 2012). The key competencies developed by Information Technology sector in India have placed it on the international canvas, thereby transforming image of the country on the global platform and facilitate its emergence as the largest sourcing destination for IT industry worldwide (Soni, 2013). Information Technology sector has contributed remarkably to India's foreign reserves and presence in the global landscape in terms of qualified workforce and exports in the sector, thereby signifying the huge potential the industry holds in the global arena.

While the IT industry has the potential to generate revenues of USD 225 billion by 2020 (Mittal, 2009), this opportunity may be difficult to seize due to emerging problems such as lack of infrastructure, increasing cost of doing business in India, rise of alternate off-shoring locations and disruptive technology trends. Unless the IT industry addresses these concerns, low-cost leadership, which is the unique

selling proposition of the industry, may not last long. IT firms in India have been exploiting the existing capabilities, resulting into the present worth of the sector, howbeit, now diminishing returns begin to stare at the industry (Soni, 2013). This changing scenario, therefore, calls for reconfiguration of the capabilities of IT firms in India, which can be done through building Knowledge-Based Dynamic Capabilities.

In the era of new economy, knowledge has replaced the basic factors of production namely land, labour and capital to thereby emerge as the prime source of competitiveness for an organization (Sher & Lee, 2004). Owing to the complex, uncertain and ever-changing environment faced by organizations, researchers have acknowledged the importance of building knowledge competences for ensuring organizational success and growth (Sorensen & Stuart, 2000). In consequence, the knowledge competencies thus attained, enable competitive advantage which is gained by building capabilities rather than by merely having access to resources (Agbim, Zever & Oriarewo, 2014).

Moreover, Dynamic Capabilities which are defined as 'the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environment' (Teece et al., 1997, p. 516) enable organizations to meet the challenges posed by the environmental dynamism which otherwise would threaten and make the existing capabilities obsolete (Winter, 2003). Such capabilities promote continual adaptation within an organization which would reduce the possibility of a need to make any disruptive change (O'Reilly & Tushman, 2008). Thus, dynamic capabilities are considered to be at the heart of a firm's strategy and value creation.

While these lines of thought have been treated as distinct and implemented in isolation in the pursuit of competitive advantage but they are in fact inter-related. Although the proposition of dynamic capabilities has its foundations in Resource-View, it appears to be closely related to the Knowledge-View of strategic management (Acedo, Barroso & Galan, 2006). It has been posited that focus on knowledge processes in isolation is insufficient in creating a consistent flow of knowledge to and from the stocks of knowledge within a company, and in contrast, over-emphasis on dynamic capabilities alone can create problems in the absence of comprehension of detailed processes involved in managing knowledge effectively (Andersén, 2012; Nielsen, 2006). Thus, addressing the need to supplement the concept of dynamic capabilities with knowledge processes of a firm (Nielsen, 2006), the present study proposes that the current schools of thoughts which came from more labour intensive and capital intensive theories of strategy can be superseded by contemporary paradigm of 'Knowledge-Based Dynamic Capability View' as organizations have become knowledge oriented especially in light of the knowledge economy wherein knowledge is the key resource to be exploited by an organization.

Literature Review

Competitive advantage is the ability of an organization to surpass its competitors in terms of superior products and services (Agbim & Idris, 2015; Jones & George, 2008). It characterizes a state in which organizations address dynamism in the external environment and continue to provide satisfactory products to customers which are better than the products offered by other players in the industry (Li & Liu, 2014).

Knowledge Process Capabilities

Knowledge management and its related processes have been represented as a subset of dynamic capabilities (Nguyen & Neck, 2008) and are considered as the First-Order Capabilities (Gold et al., 2001) which contribute to the reconfiguration of other organizational resources (Nguyen & Neck, 2008). Knowledge Process Capabilities are comprised of acquisition and conversion processes as well as protection processes.

Knowledge Acquisition and Conversion Processes mainly deal with the accumulation of knowledge (Gold et al., 2001) and facilitate the flow of knowledge from external stocks into the internal knowledge stocks of a firm (Nguyen & Neck, 2008; Nielsen, 2006) while integrating, distributing and transferring such newly acquired knowledge within the boundaries of a firm (Nguyen & Neck, 2008).

Knowledge Protection Processes strive for maintaining the proprietary nature of a firm's knowledge assets and include seeking their legal protection through the means of patents, trademarks and copyrights (Nguyen & Neck, 2008).

Knowledge processes as dynamic capabilities are considered to be a key component in the pursuit of competitive advantage (Nguyen & Neck, 2009; Verona & Ravasi, 2003; Wang & Ahmed, 2007). Organizations can discourage imitation by competitors through continuous recombination and application of knowledge and these superior stocks and flows of knowledge are likely to result into sustained advantage for an organization (Sandhawalia & Dalcher, 2011). Knowledge process capabilities aid in increasing organizational effectiveness and gaining competitive advantage (Paisittanand, Digman, & Lee, 2009). Therefore, H1 has been postulated as:

H1: Knowledge Process Capabilities have a significant impact on firm's Competitive Advantage.

Higher-Order Dynamic Capabilities

Adaptive, Innovative and Absorptive Capabilities are the most important industry-level dynamic capabilities that transcend firm level capabilities of dynamism (Wang & Ahmed, 2007).

Adaptive Capability refers to the proficiency of a firm to rapidly reconfigure and coordinate resources in response to swift environmental changes (Gibson & Birkinshaw, 2004). It encompasses the ability of a firm to reconfigure resources and coordinate processes promptly in order to develop more successful products and seize the opportunities emerging in the market (Hofer, Niehoff & Wuehrer, 2015).

Absorptive Capability refers to a firm's ability of identifying, assimilating and applying valuable external information towards commercialization (Cohen & Levinthal, 1990; Helfat & Peteraf, 2003). It exemplifies a learning processes which includes ability to identify, grasp and employ knowledge (Lane et al., 2006).

Innovative Capability refers to the firm's ability to venture into new products or new markets, by aligning strategic orientation with processes (Wang & Ahmed, 2004). Innovation can be classified into product innovation, process innovation, and managerial innovation (Tsai, Huang, & Kao, 2001).

Once knowledge is integrated into a firm's knowledge base, it serves as an incentive to develop a greater ability to adapt to changes by encouraging the employees of an organization to be innovative and to take initiatives in seeking methods of adapting to new techniques, technologies and approaches (Monferrer et al., 2015). Moreover, literature suggests that the ability to capture, absorb and make use of external knowledge, facilitates the process of innovation (Monferrer et al., 2015; Su et al., 2013). Knowledge can thus be viewed as a pre-eminent resource which can serve as a base for building higher-order dynamic capabilities (Alfirevic & Talaja, 2013; Prieto & Easterby-Smith, 2006; Schienstock, 2009; Verona & Ravasi, 2003) and it can be assumed that the former precedes and therefore leads to the development of the latter (Ali & Christofferson, 2011; Lee et al., 2011; Nieves & Haller, 2014). Thus, it is proposed that:

H2: There is a significant relationship between Knowledge Processes Capabilities and Higher-Order Dynamic Capabilities of an organization.

Knowledge-Based Dynamic Capabilities and Competitive Advantage

Adaptive capability is considered to be an organization's ability to sustain competitive advantage by modifying, reconfiguring or interconnecting resources and capabilities so as to quickly adapt to the fast-moving environment (Kaehler et al., 2014). Adaptability is more likely to lead to higher performance by directing a firm to use its operational and dynamic capabilities more effectively, thus forming a base for obtaining organizational advantage (Rouse & Ziestma, 2008).

Capacity to absorb external knowledge plays a dominant role in renewing knowledge base of a firm and it provides a firm all the skills necessary to compete in changing markets (Zahra & George, 2002; Su et al., 2013). Absorptive capability can thus be a potential source of competitive advantage as it facilitates the transformation of the new or acquired knowledge into usable knowledge (Adeniran & Johnston, 2012; Cadiz et al., 2009; Zhou & Li, 2010).

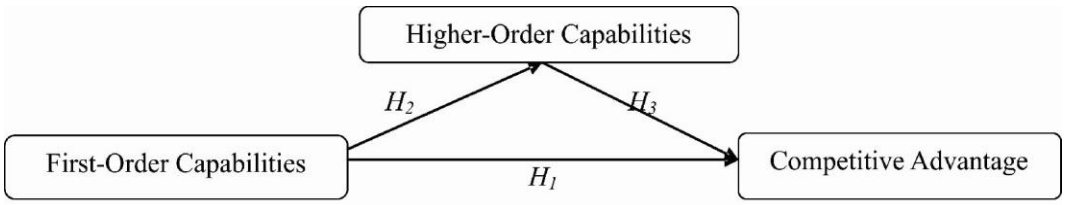
Firms with higher innovative capabilities outperform competitors, exhibit higher profitability and have higher survival probabilities as the competitive advantage of the firm increases with innovation (Adeniran, 2011). Innovative capability aids in distinguishing a firm from its competitors, which can help in gaining edge in the market (Adeniran, 2011; Adeniran & Johnston, 2012; Alfirevic & Talaja, 2013; Su et al., 2013).

Thus it can be posited that Higher-order Dynamic capabilities viz. Adaptability, Absorptiveness and Innovativeness form the foundation for competitive edge of firm (Schienstock, 2009) and are vital in the quest for competitive advantage (Ambrosini & Bowman, 2009; Nieves & Haller, 2014; Prieto & Easterby-Smith, 2006; Zheng et al., 2011). Also, as in the above discussion it was also concluded that knowledge process capabilities significantly impact competitive advantage as well as the development of higher-order dynamic capabilities (Nguyen, 2010), thus intermediary role of higher-order dynamic capabilities can be assumed between knowledge process and competitive advantage. Based on these insights, the following Hypothesis is proposed:

H3: Higher-Order Dynamic Capabilities play a mediating role between Knowledge Process Capabilities and Competitive Advantage of a firm.

On the basis of relationships identified in the above sections, the following conceptual framework (figure 1) is proposed.

Figure 1: Conceptual framework



Source: Proposed by the authors

Research Methodology

This section deals with developing measures of various theoretical constructs which form a part of the study as well as outlines statistical techniques applied for data collection and data analysis.

Measurement of Variables

All measurement items of variables are derived from the existing literature. The constructs of Knowledge Process Capabilities are adapted from the study of Gold et al. (2001) and Nguyen and Neck (2008). The items for measuring Adaptive Capability were adapted from Akgün, Keskin and Byrne (2012), while the items for measuring Absorptive Capability were adapted from Liao et al. (2007) and Kaehler et al. (2014) and those for measuring Innovative Capability were adapted from Liao et al. (2007). The items to measure Competitive Advantage are based on the work of Li and Liu (2014). The items were measured using a seven point Likert scale ranging from (1) 'strongly disagree' to (7) 'strongly agree'. The operational definitions of the variables, derived from the literature for the purpose of this study are given in Table 1.

Table 1: Operational Definitions of Variables

Knowledge Acquisition and Conversion	The ability to generate or obtain new knowledge from the existing stock of knowledge through learning mechanisms as well as business colla borations (Nguyen & Neck, 2008) as well as to integrate, organize and transfer the newly acquired knowledge (Gold et al, 2001).
Knowledge Protection	The ability to secure knowledge from inappropriate use and theft (Nguyen & Neck, 2008) .
Adaptive Capability	The ability to monito r changes in the market and to come at par with
Absorptive Capability	The ability to collect and comprehend new knowledge gained through business collaborations and enhance working sk ills with the use of such knowledge (Kaehler et al., 2014; Liao et al.; 2007)
Innovative Capability	The ability to acquire new skills/equipment to improve the service process and provide clients with products and services that offer unique benefits superior to those of competitors (Liao et al., 2007).
Competitive Advantage	The ability to hold an increasingly higher market share by offering superior products and services while enjoying a greater sales revenue and profit growth rate in comparison to competitors in the industry (Li & Liu, 2014).
First-Order Capabilities	Knowledge Processes as Dynamic Capabilities which are com prised of Knowledge Acquisition and Conversion Capabilities as well as Knowledge Protection Capabilities.
Higher-Order Capabilities	A Higher Order construct comprising of three Dynamic Capabilities namely Adaptive Capability, Absorptive Capability and Innovative Capability.

Source: Developed for this research

Data Analysis

A study formed the part of pilot survey which was conducted in order to preliminarily examine the validity and reliability of the instrument. Online questionnaire was sent to 100 employees working in IT Multinational Companies (MNCs) in India. After the data was entered into IBM SPSS 21.0 software, exploratory data analysis was conducted to examine the data for normality and outliers . A Shapiro-Wilk's test ($P > 0.05$) and a visual inspection of histograms, normal Q-Q plots and box plots confirmed the normality of data.

In order to pre-test the instrument, an exploratory factor analysis using Principal Components Analysis was performed with Varimax rotation and criteria of eigenvalue 1, factor loading 0.50 and total variance extracted 50 per cent (Gerbing & Anderson, 1988). Orthogonal rotation (varimax) was used with a purpose of getting factors that are as uncorrelated as possible with each other . Further, to ensure uni-dimensionality of constructs no item was allowed to load on more than one factor (Nguyen & Aoyama, 2014) and those items comprising a scale were retained that loaded highly on one factor thus ensuring discriminant validity (Hair et al., 1998). The factor analysis for all the scales met the basic requirements of the determinant being above .00001, Kaiser-Meyer-Olkin (KMO) being greater than .70 and the Bartlett test being significant . In addition, Cronbach's alpha was applied to determine the reliability of the scales which yielded results within the acceptable range of 0.70 to 0.95 . The final measurement items for competitive advantage are given in Table 2. All the items loaded on a single factor with the total variance explained equal to 69.160%, KMO value of 0.855 and Cronbach's Alpha value of 0.891.

Table 2: Competitive Advantage Construct Measurement Scale

Competitive Advantage	**Loading**	**Cronbach's Alpha**
Compared with our competitors, my company has a higher profit growth rate.	.833	0.891
Compared with our competitors, my company has increasingly higher market share.	.831	
Compared with our competitors, my company has more profitable old customers.	.817	
Compared with our competitors, my company has more profitable new customers.	.794	
Compared with our competitors, my company has better product and service quality.	.782	
Compared with our competitors, my company has a higher sales revenue growth rate.	.775	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.855	
Total Variance Explained	69.160%	

Source: Developed for this research

The final measurement items for measuring the level of Knowledge Process Capabilities along with their factor loadings, KMO and alpha values are given in Table 3.

Table 3: Knowledge Process capabilities Construct Measurement Scale

Knowledge Acquisition and Conversion	**Factor loadings**	**Cronbach's Alpha**
My Company has processes for acquiring knowledge about our suppliers	0.807	0.941
My Company uses feedback from previous projects to improve future projects.	0.784	
My Company has processes for acquiring knowledge about our customers.	0.764	
My company has processes for organizing and storing knowledge.	0.753	
My Company has processes for generating new knowledge from existing knowledge.	0.751	
My company has processes for using knowledge to solve new problems.	0.742	

My company has processes for integrating different sources and types of knowledge.	0.740		
My company has processes for converting knowledge into the design of new products/services.	0.721		
My company has processes for transferring organizational knowledge to individuals.	0.678		0.950
My Company has processes for exchanging knowledge with our business partners.	0.638		
My company has processes tor converting competitive intelligence into plans of action.	0.622		
Protection Processes			
My company has policies and procedures for protecting trade secrets.	0.854		
My company has processes to protect knowledge from theft from within the organization.	0.821		
My company has processes to protect knowledge from inappropriate use inside the organization.	0.804	0.911	
In my company, knowledge that is not meant to be shared is clearly known.	0.777		
My company clearly communicates the importance of protecting knowledge.	0.758		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.900		
Total Variance Explained	67.108%		

Source: Developed for this research

The measurement items for Higher-order Dynamic Capabilities along with their factor loadings and alpha values are given in Table 4.

Table 4: Higher-order Dynamic Capabilities Construct Measurement Scale

Innovative Capability	**Factor Loadings**	**Cronbach's Alpha**	
My company encourages employees to contribute to activities like product development and development of new ideas.	.859		
My company emphasizes innovative and creative capability while recruiting staff.	.841		
My company provides clients with services/products that offer unique benefits superior to those of competitors.	.721	0.887	
My company inspires me to provide clients with innovative ideas and solutions.	.600		
I am encouraged to acquire new skills/equipment to improve the service process.	.513		
Absorptive Capability			
Employees in my company regularly approach third parties such as accountants and consultants.	.858		0.926

I am encouraged to collect industry information through informal means (e.g., lunch with industry friends, talks with trade partners).	.767	0.869	
Employees in my company regularly visit other firms in the industry.	.751		
I am encouraged to make frequent interactions with other companies to acquire new knowledge.	.670		
Employees in my company have better working skills than the staff of competitors.	.544		
Adaptive Capability			
My company keeps a check on changes in the market.	.805	0.862	
My company encourages me to adopt new marketing techniques.	.798		
My company constantly observes competitors' actions.	.790		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.884		
Total Variance Explained	72.464%		

Source: Developed for this research

Data Analysis Techniques

Correlations and multiple regression analysis was performed to test the hypotheses. Before running the multiple regression analysis, a test for multicollinearity was conducted which yielded a Variance Inflation Factor (VIF) equal to 1 which is well below the red sign of value ranging between 5 and 10 (O'Brien, 2007).

Results and Discussions

A correlation analysis was performed to study the relationships between the variables. The results of bivariate correlation showed moderate to strong positive and significant relationships between all the variables which are illustrated in Table 5.

Table 5: Correlations

Pearson Correlation	Knowledge Process Capabilities	Higher-order Dynamic Capabilities	Competitive Advantage
Knowledge Process Capabilities	1	.666**	.644**
Higher-order Dynamic Capabilities	.666**	1	.800**
Competitive Advantage	.644**	.800**	1

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

The results of multiple regression analysis (Table 6) using Enter method proved the first hypothesis that Knowledge Process Capabilities (KPC) have a significant impact ($p < .001$) on firm's Competitive Advantage as the process capabilities explain around 40% variation in Competitive Advantage (CA). The value of standardized Beta coefficient at 0.644 (table 7) as well as t-value (7.395) is statistically significant at p value less than .001.

Table 6: Model summarizing relationship between KPC and CA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
KPC	.644[a]	.415	.408	.60145

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.086	.466		4.480	.000
	KPC	.618	.084	.644	7.395	.000

Dependent Variable: CA

The results of multiple regression analysis (Table 8) also provided support for the second hypothesis that there is a significant relationship ($p < .001$) between Knowledge Process Capabilities (KPC) and Higher-order Dynamic Capabilities (HODC) as the process capabilities explain around 43% variation in HODC. The value of standardized Beta coefficient at 0.666 (table 9) as well as t-value (7.831) is also statistically significant at p value less than .001.

Table 8: Model summarizing relationship between KPC and HODC

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
KPC	.666[a]	.443	.436	.62304

Table 9: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.674	.482		3.471	.001
	KPC	.678	.087	.666	7.831	.000

Dependent Variable: HODC

Three equations of multiple regression confirmed the conditions laid down for confirming mediation (Baron & Kenny, 1986). As proved above, Knowledge Process Capabilities (independent variable) significantly affected the mediator i.e. Higher-order Dynamic Capabilities ($B=.666$, $p<0.01$). Knowledge-Process Capabilities also significantly affected the dependent variable i.e. Competitive Advantage (Adjusted $R2=.408$, $B=.644$, $p<0.01$). The mediating role is confirmed when the relationship of the independent variable with the dependent variable is reduced when the mediator is introduced into the equation (Baron & Kenny, 1986). To demonstrate the mediating role, a hierarchical multiple regression analysis was performed the results of which established partial mediation of Higher-order Dynamic Capabilities between the Knowledge Process Capabilities and Competitive Advantage as in comparison to the second equation the Beta weight reduced to 0.201 (Table 11) but as the relationship still remained statistically significant ($p<0.05$), thus partial mediation can be affirmed. Moreover, the addition of Higher-order Dynamic Capabilities accounted for an additional 24% of the variance (table 10) in Competitive Advantage.

Table 10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change
1	.644[a]	.415	.408	.60145	.415
2	.814[b]	.662	.653	.46038	.247

a. Predictors: (Constant), KPC

b. Predictors: (Constant), KPC, HODC

Table 11: Coefficients

Model		Un-standardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.086	.466		4.480	.000
	KPC	.618	.084	.644	7.395	.000
2	(Constant)	1.037	.383		2.705	.008
	KPC	.193	.086	.201	2.251	.027
	HODC	.627	.084	.666	7.445	.000

Dependent Variable: CA

Conclusions and Future scope of research

It was asserted in the literature that some relationship exists between knowledge and dynamic capabilities of a firm, but the details of the relationship were unclear (Prieto & Easterby-Smith, 2006). There was a lacuna in literature regarding the role of knowledge processes as determinants of dynamic capabilities especially in multinational firms that operate in radically-changing environments (Nieves & Haller, 2014). Thus, an in-depth examination of this relationship in the present study was an attempt to provide deeper understanding of the complex relationships between these concepts. The study has aided in bringing research in the field of competitive advantage one step ahead by integrating it with the literature on knowledge processes as well as the dynamic capabilities approach.

The study has been successful in suggesting an edifice to the existing strategic management literature by proposing a novel view of Knowledge-Based Dynamic Capabilities which states that rather than employing the Knowledge-Based View and Dynamic Capability View in isolation, when knowledge Process capabilities are leveraged to form Higher-order Dynamic Capabilities, such Knowledge-Based Dynamic Capabilities have much more potential to generate competitive advantage for a firm.

As knowledge has emerged as the key resource promising enhanced competitiveness for a firm (Teece et al., 1997), it can become more useful to industry when its component parts and processes are thoroughly understood through such studies and brought to practice. A holistic approach of knowledge-based dynamic competences adapted in the current research can enable firms especially in a multinational setup to build their resource base through knowledge process capabilities while directing the activities of a firm towards strategic advantage. As managers of multinational companies have to regularly make decisions about renewing existing operational capabilities in alignment with the changing global environment, development of Knowledge-Based Dynamic Capabilities are of utmost importance for managers in their pursuit of competitive advantage.

The repetition of this study in other industries and countries can form a promising future work of research and can further help in validating the proposed framework. In a review of literature on dynamic capabilities, it was found that the research on this concept is still at a nascent stage. Moreover, the theory of the multinational corporations does not effectively address issues relating to competitive advantage (Teece, 2014) which are of utmost importance for a firm operating at a global level. Furthermore, there are very few studies which have been done on dynamic capabilities in Indian context. Hence, there are possibilities for future studies on knowledge-based dynamic capabilities, both qualitative and quantitative, as well as for new literature reviews.

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