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How does Technology Orientation impact Competitive Advantage during Technology Turbulence? The mediating role of Innovation

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Abstract: *This study looked at innovation and technology orientation which provide IT-based businesses a competitive edge in the context of small and medium-sized businesses (SMEs), which are particularly susceptible to high levels of technological turbulence. The research process consisted of three steps: 1) a literature review; 2) an empirical investigation utilizing questionnaires to collect data; and 3) a structural equation modeling (SEM) and confirmatory factor analysis (CFA) analysis and interpretation of the results. The results shown that competitive advantage is directly increased by technology orientation, and that even in the face of significant technological instability, competitive advantage keeps growing when innovation is incorporated into the model as a mediator. According to the findings, entrepreneurs—SMEs in particular—need to be able to adjust and quickly become ready for the impending technological changes in the environment, which will happen not only on a global scale but also at the national and industrial levels. Organizations must prioritize the growth of innovation in addition to their technological orientation. In this fiercely competitive world, innovation will become a vital strategic tool for companies looking to expand, start, and improve their operations and acquire competitive advantages that are comparable to or better than those of their competitors.*
Keywords: *Technology Orientation, Competitive Advantage, Innovation, Technology Turbulence*

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I. Introduction:

By creating the technical framework for future innovations, new technological developments act as a stimulant for economic expansion (Carayannis et al., 2006). Modern technology is essential for promoting innovation in the corporate sector because it makes it easier to design, adapt, and implement the most creative business strategies. Because companies have a lot of leeway to import and alter ideas developed in industrialized countries, this is particularly crucial for emerging economies (Von Broembsen, M., Wood, E., and Herrington M. 2005). Businesses in emerging economies have numerous opportunities to embrace a technical posture or orientation that can provide them with the competitive advantage they require to compete globally, thanks to the expanding trend of globalization (Urban, B. and Barreira, J. 2009). As the 21st-century economy transitions to one that is primarily driven by technology and knowledge, entrepreneurs must identify and anticipate high-technology opportunities in order to become future entrepreneurial leaders (Kourilsky and Walstad, 2002).

Young businesses are an important source of employment, innovation, and economic progress. Given the market problems and economic volatility that characterize the current business environment in the wake of the global recession of 2008, it is imperative to understand the factors that contribute to the high performance of these SMEs (Abebe et al., 2014). SMEs aim to minimise the consequences of ongoing cost-cutting initiatives and price wars while simultaneously maximising new market opportunities (Masa'deh et al., 2015; Smith et al., 2017). The ongoing appearance of new competitive issues is also forcing businesses to reassess their internal environments in order to preserve a competitive edge and boost performance (Almajali et al., 2016). The strategy of a company has a significant impact on its activities, investments, market relationships, structure, and performance (Valos and Bednall, 2010; Ajmal et al., 2017). According to Sarker and Palit (2015), this approach gives businesses the ability to solve problems, develop new skills, and enhance business performance by giving them a method to acquire specific resources, find opportunities to provide valuable goods and services, and market those goods and services to increase profits (Al-Ansaari et al., 2015).In order for an organization to adopt the best strategies it needs to coordinate its approaches in establishing industry positions and/or by relying on its resources, competences and capabilities with the goal of integrating with the environment, both internal and external, in order to maintain a competitive advantage and increase company efficiency. To be able

to achieve these goals organizations need to focus on their strategic orientations (Al-Ansaari et al., 2015; Adewunmi et al., 2017). This is because, in order to monitor its operations and improve company performance, a firm's strategic orientation sets the path for its strategic direction (Freitas et al., 2013).

Since conventional strategies have grown outdated, organizations are forced to look for new ones that create a competitive edge (Salim and Sulaiman, 2011). Thus, it is evident that strategy is crucial to an organization's ability to compete and survive (Tseng and Lee, 2014; Obeidat et al., 2016). One particular facet of strategy that needs to be addressed is the selected strategic orientation. Numerous academic fields witness to the significance of strategic direction, which has a favorable impact on business operations and performance (Thoumrungroje and Racela, 2013). Organizations have been pushed to be more sensitive to their performance due to all of the changes that are taking place in their business environment (Shahin et al., 2014). Organizations seek to preserve their steady market position in today's fiercely competitive and quickly changing market by gaining a sustained competitive edge through the use of technology orientation, one of the best strategic orientations. The ability and readiness of SMEs to adopt a technical perspective and apply it to the development and enhancement of goods and services is known as technology orientation (Putra et al., 2022). By taking certain steps, such as concentrating on the future, asking top management to support new technologies, evolving beyond an adhocracy culture, and widely implementing advanced technology, technology-oriented SMEs can cultivate technological advantage during the new product generation phase (Srinivasan et al., 2002).

II. Review of Literature:

Technology Orientation

According to Tambunan (2019) and Zhang et al. (2018), the technology-driven technique is designed for proactive creation and rapid coordination to become educated with technological advancements and then apply such innovations in the business process, such as improving new products. Given that consumers are very interested in these services and products, a technology-driven company may surpass expectations in terms of maximizing return through the production and distribution of goods and services (Jawad et al., 2019; Schlaegel and Reichel, 2017). Thus, technology-driven solutions boost organizational performance by enabling businesses to create high-quality products that effectively meet consumer demands (Frambach et al., 2016; Zulu-Chisanga et al., 2016; Yousaf et al., 2020). According to Ardito and Dangelico (2018) and Yousaf and Majid (2017), technology orientation is the tendency of a business to employ state-of-the-art technology to introduce new products while simultaneously improving existing services and goods by encouraging and supporting innovative ideas.

Competitive Advantage

According to Newbert (2008), competitive advantage is the implementation of a strategy that other businesses have not yet employed that makes it easier to cut expenses, take advantage of market opportunities, and/or eliminate competition threats. Performance is usually measured by the profits a business makes as a result of implementing the strategy. For SMEs, competitive advantage is seen as the primary determinant of success (or failure) in an extremely volatile global market. Kwarteng et al. (2016) further emphasized that SMEs must build dynamic capability to deal with the resource environment's paradoxical nature. One of the most important components for SMEs to achieve economic sustainability is competitive advantage, claim Fiori and Foroni (2019). Firms are more likely to have an edge over competitors if they are willing to invest certain resources, such as implementing new technology, in order to turn a profit. According to Sidek et al. (2020), businesses can obtain a competitive edge by implementing a strategy of constant innovation to satisfy the needs of the customers they serve.

Innovation

Innovation can be defined as "the implementation of a new and significantly improved product (good or service) or a process, a new marketing method, or a new organizational method in business practice, workplace organizations, or external relations," according to the OECD and Eurostat 2005, page 46. Innovation is seen as a crucial component of a company's ongoing success since it can improve overall performance by meeting customer needs (Davidson 1976; Szymanski, Sundar, Bharadwaj, and Rajan 1993). (Yalcinkaya, Calantone, and Griffith 2007). Most people agree that implementing innovation improves a company's performance (Maldonado-Guzman et al., 2019; Pastor Perez et al., 2019). Innovation in management systems aims to better manage personnel and arrange work while adapting to changing environmental conditions (Ali et al., 2023). However, empirical research on the connection between innovation and performance in SMEs has produced contradictory results. Some researches have found that the innovation performance connection depends on the context. The type of innovation, the company's age, and the cultural context all affect how innovation affects firm performance (Rosenbusch et al., 2011). Furthermore, it is widely acknowledged that

truly innovative companies can generate unique solutions that challenge those of their competitors (Hughes and Morgan, 2007). According to Hult et al. (2004), managers in these kinds of companies frequently devise innovative solutions to business issues that "provide the basis for the survival and success of the firm well into the future.

Technology Turbulence

According to Calantone et al. (2002), environmental turbulence is an environment where market and/or technological changes occur frequently and without warning, providing risks and instability at all stages of the development of new products and services. According to the research, there are seven environmental turbulence variables that management of any organization typically has little influence over (Sharifi & Zhang, 2001). These include market and competitive intensity, as well as technical turbulence (Kohli & Jaworski, 1990; Jaworski & Kohli, 1993). Technological turbulence refers to the speed and diversity of technological change. According to research, a company's and an industry's capability and ability to assure efficient operations and preserve competitive integrity are largely dependent on technology (Poon, 1993). On the other hand, businesses with very stable technologies are typically not in a position to leverage technology to obtain a competitive advantage (Kohli & Jaworski, 1990). If a company is continuously unaware of technological developments, it will be less prepared to offer products and services to customers (Lengnick-Hall & Wolff, 1999).

Hypotheses Development

Technology Orientation- Competitive Advantage

To boost revenue and enhance business unit management effectiveness, a technology-oriented approach is necessary (Al-Idrus et al., 2020). Additionally, an organization can attain economic sustainability through the use of technology (Samsir, 2018). Technology adoption is crucial for business value creation, specialization, and the ability to provide economic growth and a competitive advantage. By following guidelines like looking to the future, urging upper management to support new technologies, and moving beyond an adhocracy culture and widely introducing advanced technologies, technology-oriented SMEs can cultivate technological opportunism during the new product generation period.

Technology-oriented SMEs may indicate that they have applied their technical expertise to create the best possible solutions for their users' needs (Gatignon & Xuereb, 1997). Technology orientation is also seen as a company-specific strategic orientation that is based on culture and comprises advanced skills that blend well with the organization's resource base (Day, 1994; Zhou et al., 2005). According to Nakola et al. (2015), a company's ability to create superior competitiveness tends to rise with its level of success in applying a technology orientation.Technology orientation can impact SMEs' competitive advantage, according to a number of earlier research (Urban & Barreira, 2009; Binneman & Steyn, 2014; Liu & Su, 2014; Halac, 2015; Ibrahim & Shariff, 2016). Thus we hypothesize

H1: Technology orientation is positively related to the competitive advantage.

Innovation as a mediator

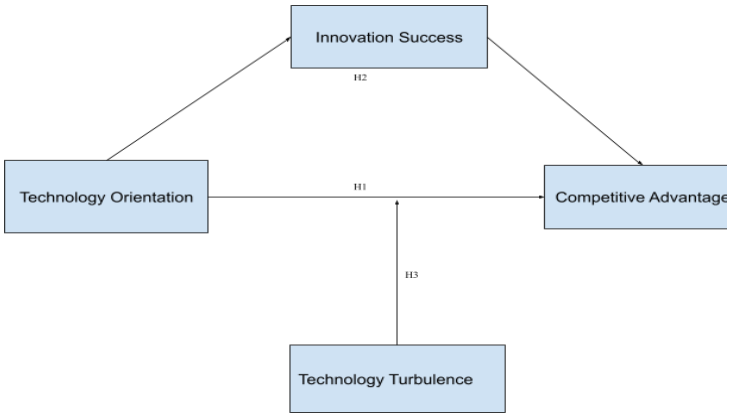
The firm's technical expertise plays a significant role in creating innovative processes, goods, and services (Henard et al., 2006, Zhou et al., 2005). According to Ettlie et al. (1982) and Wilson et al. (1999), the company's internal technology policy demonstrates its innovative mindset and dedication to innovation. According to Hitt et al. (1990), a firm's ability to gain a competitive edge can be influenced by its attitudes toward innovation and technology. In order to establish a robust competitive edge, small business owners had to be more proactive in making use of all of their resources. SMEs that work together to compete more successfully in the market can get a competitive edge (Sinambela et al., 2021). Companies that aggressively seek out emerging technologies that are innovative may be more creative because they focus on using these technologies to create new products, services, and processes that satisfy consumer demands (Cooper et al., 1994). SMEs get a competitive edge when market or industry activities generate economic value and when many rival companies take comparable measures (Barney, 2010). Utilizing current technology and making the most of entrepreneurial skills are two ways to optimize SMEs' competitiveness (Darmawan & Hariani, 2020). Through innovation, companies can introduce new or enhanced products to the market ahead of their rivals, thereby expanding their market share Innovation gives businesses a competitive edge and has contributed to the success and prosperity of numerous enterprises (Goksoy, Vayvay, & Ergeneli, 2013; Lim, Chesbrough, & Ruan, 2010).In addition to being a precursor to innovation-based companies, TO is considered a significant determinant of innovation in businesses that rely heavily on technology (Batra et al., 2015; Jongman et al., 2020). A company's degree of technological orientation greatly affects its capacity for innovation and is seen as a source of competitive advantage (Humphreys et al., 2005), both of which can improve business performance

(Voss et al., 2000). In addition to thoroughly covering the R&D process, technology-driven organizations offer the most recent information and developments about technology to improve their performance (Acar and Ozs €¸ahin, 2018). Businesses that deal with technology, such as software houses, continually encourage the collecting and gathering of new information and store it while investing heavily in research and development (Arora et al., 2016). They make direct investments in new technology, choose products, and lay the foundation for robust organizational innovation (Joshi, 2015). Organizational innovation may provide a competitive advantage to the company if it is implemented appropriately and in a suitable direction (Yousaf et al., 2020).
H2: Innovation positively mediates the relationship between Technology Orientation and Competitive Advantage

Technology Turbulence as a moderator

The focus of competitive strategy is on the market's enduring competitors, which businesses want to outperform by establishing a dominant market position (Walker and Madsen, 2016). The emergence of technological turbulence increases the need for organizational reform based on a dynamic social structure to manage intangible assets and balance innovation portfolios by addressing traditional industry boundaries (Lawrence and Phillips, 2019). Teece (2019) draws attention to hyper-competition, which demonstrates an organization's capacity to bounce back from a crisis by fostering quick innovation and embracing more independence to handle opportunities throughout the world. If SMEs allocate their resources in a more ambitious and creative way, they could anticipate better performance (Klingebiel and Rammer, 2014). However, the relationship between return of Technology Orientation and Competitive Advantage could be heterogeneous due to differences in expectation on the value of resource availability (Kunc and Morecroft, 2010). Technological capability increases firms' expectation to achieve greater performance (Ruiz-Ortega et al., 2013). SMEs may make substantial investments in R&D through utilizing radical technological turbulence (TT), but may pursue inferior technology to leverage their assets (Wu et al., 2014). The dynamic capability offers more complicated effects on competitive advantage under a dynamic business environment, ranging from stable to very dynamic environmental settings (Schilke, 2014).Mu and Di Benedetto (2011) argue that firms must increase their R&D ability and innovative capability to bring next-generation products under technology turbulence. This would require firms to adopt technology orientation inorder to have an ample knowledge base, resources to locate technological innovations, gain competitive advantage when technology changes rapidly and introduce new processes, products and services to satisfy customer needs (Hamel et al., 1996).

H3: Technology Turbulence positively moderates the relationship between Technology Orientation and Competitive Advantage



Conceptual Framework

III. Research Methodology:

Information technology (IT) encompasses a wide range of computers and emerging communication technologies, including the creation, maintenance, and application of computer hardware, software, and networks.India's information technology sector has been crucial in establishing the country's international recognition, and it currently serves as the global hub for IT. The IT sector is one of the most important growth catalysts for the Indian economy contributing considerably to India's gross domestic product (GDP) (IBEF report, 2024). The IT industry accounted for 8% of India's GDP in 2020 and it is expected to contribute 10% to India's GDP by 2025 (Financial Express report, 2022).

This study is quantitative in the way in which a survey has been conducted through questionnaires. The

element of investigation for this study is technology based SMEs of India. As the IT sector is a fast growing industry and majorly depends on technology, where alterations and newest developments take place unprecedentedly (Masa'deh et al., 2018), therefore this study was undertaken to understand the interplay of technology orientation and competitive advantage in the presence of innovation and when the environment is technologically turbulent.

Sample Size

The data were collected from the National Capital Region (NCR) of India. The NCR was chosen as it is upcoming as a hub for the technology based SMEs in India (Chaudhary, 2011). The study population consisted of the most accomplished IT experts and managers employed in India's IT and ITeS (information technology and information technology enabled services) sectors. The study hence chose to target all the executives from IT services industry, software products industry and hardware industry. This is a cross-sectional study in which the sample size consisted of 200 IT leaders and senior executives from the Indian IT based SME firms.Since this study has a specific purpose to investigate a certain framework, it therefore adopted the method of purposive sampling (also known as judgement or selected sampling) for the purpose of taking experts‟ opinion related to firms‟ strategic oriented behavioral decisions of innovations from these selected senior management consultants.

Data Collection

The questionnaire comprised both five-point Likert-scale items (1 strongly disagree to 5 strongly agree) and objective questions. The survey was pilot-tested on five firms. The questionnaire was targeted at the entrepreneur-leader defined as the CEO/president of each firm. Given that only firms below 7 years old are included, this indicates that respondents had enough experience with their firms. A total of 450 such firms were contacted, of which 200 agreed to participate. In the final sample of 200, 80 responses were from hardware firms and 120 from service-sector-based firms as shown in Table 1 The final sample included firms with age ranging from 3 to 7 years and number of employees ranging from 5 to 250. As multiple waves of data collection were engaged in, non-response bias was tested. The analysis revealed no statistically meaningful differences among the last 10 responses received with the previous 60 responses in terms of firm age, size, and sales turnover. Thus, it can be assumed that the data did not suffer from non-response bias.

Table 1-Sampling Profile

Demographic	**Age**	**Frequency**	**Percentage**
Age of SMEs	Less than 3 years	33	16.5%
	03 - 05 years	84	42%
	05 - 07 years	81	40.5%
	Above 7 years	2	1%
	Aggregate	*200*	*100%*
Number of	>5	32	16%
	5 - 49	76	38%
	50 - 149	59	29.5%
	150 - 250	33	16.5%
	Aggregate	*200*	*100%*
Sales Turnover	1 million - 3 million	31	15.5%
	3 million - 6 million	98	49%
	7 million - 10	62	31%
	Upto 10 million	9	4.5%
	Aggregate	*200*	*100%*
Respondent Title	Owner/CEO	55	27.5%
	Director	65	32.5%
	General Manager	45	22.5%
	Others	35	17.5%

	Aggregate	*200*	*100%*

Measurement Scales

The measurement model consists of twenty seven measured items and four latent variables.Technology orientation was measured using the five item scale by Alloca and Kessler (2006).Competitive advantage includes cutting costs, taking advantage of market opportunities for better performance, and differentiating the company to attract customers. The indicators of competitive advantage (seven items) in this study were derived from Kuo et al. (2017), while the technology turbulence was adopted from Zhang and Duan (2010). The 10 items scale for innovation was adapted from the study of Blumentritt and Danis (2006). Table 2 illustrates the measurement scales.

Table 2 Survey Instrument

Latent Variable	***Item Code***	***Statements***	***Source***
Technology Orientation	TO1	Our firm's policy is to adopt up- to-date technologies	Allocca and Kessler (2006)
	TO2	Our firm purchases and uses technologies to position itself ahead of competitors	
	TO3	Our firm is often the first to try out new methods and technologies.	
	TO4	Our firm frequently improves internal processes such as speed, reliability, and information management.	
	TO5	Our firm allocates resources for investments in latest technologies and future forecasted technological changes.	
Innovation	INN1	Our firm frequently tries out new ideas.	Blumentritt and Danis (2006)
	INN2	Our firm introduces a number of new products, services, processes, or organization/management systems.	
	INN3	Our firm is first to market with new products or services.	
	INN4	Our management seeks out new ways to do things.	
	INN5	Our firm is creative in its methods of operation.	
	INN6	Our firm uses up-to-date technologies	
	INN7	Our firm develops new market segments	
	INN8	Our firm uses new marketing methods	
	INN9	Our firm develops new ways of establishing relationships with customers	
	INN10	Our firm spends resources on research and development for new products, services, or processes	
Competitive Advantage	CA1	Our products are difficult for competitors to copy	Kuo et al. (
	CA2	Our response to competitive moves in the marketplace in good	
	CA3	Our ability to track change in customer needs and wants is better than our competitors.	
	CA4	We are quickly to respond to customer complaints	
	CA5	Our product designs are unique	
	CA6	Our products have a significant advantage over those of our competitors	
	CA7	We make effort for product changes to overcome customers dissatisfaction with existing	

		products	
Techno logy Turbul ence	TT 1	The technology in our industry is changing rapidly.	Zhang and Duan (2010)
	TT2	A large number of new product ideas have been made possible through technological breakthroughs in our industry.	
	TT 3	Technological changes provide big opportunities in our industry.	
	TT	Technological developments in our industry are rather minor.	
	4		
	TT5	It is very difficult to forecast where the technologies in our markets will be in the next five years	

Common method variance (CMV)

As the data were collected using perception-based surveys from single informants, to avoid Common Method Variance (CMV) the following measures were taken: the survey was completed using paper and pencil; the respondents were assured of anonymity; the research model being tested was not disclosed; and the items pertaining to different constructs were randomly sequenced (Podsakoff et al., 2003).TThe one-factor test was used to quantify the issue of common method variance (CMV) (Podsakoff et al. 2003). The results of Harman's single factor test revealed that CMV was not severe in this sample, with the highest component accounting for 44.44% of variance. This was lower than the recommended 50% limit (Podsakoff et al., 2003).

Analysis and Discussion:

Descriptive Statistics

Table 3 reports a summary of descriptive statistics and correlations among constructs. It is therefore concluded that there is no problem of high correlation among the variables.In addition, the values of variance inflation factors (VIF) are less than 3.0, which indicate that collinearity is not an issue for the model.

Table 3

	Mean	***SD***	***VIF***	***TO***	***CA***	***INN***	***TT***
Technology Orientation	3.28	1.075	1.93	1			
Competitive Advantage	3.32	1.063	1.89	.626**	1		
Innovation	3.32	1.106	1.95	.542**	.631**	1	
Technology Turbulence	3.33	1.077	1.90	.592**	.625**	.757**	1

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

The partial least square - structural equation model (PLS-SEM) approach is used in this study to estimate complex models that have six hypotheses and five components. The sequences of the construct and their relationships, which are essential to describe the hypothesis, are the two main concerns of a structured model. We use this strategy because it has great statistical power to investigate evolving theories and is appropriate for exploratory research (Hair et al., 2019). Two components make up this method: measurement model and structural model. In an effort to explain the competitive advantage as a dependent variable, the structural model reveals the constructs that are related to one another.

Measurement Model

The first step in PLS-SEM analysis is the assessment of the measurement model (outer model). The outer model focuses on the component measurement, assessing how well the items, or indicators, load theoretically and correlate with the relevant constructs. In other words, analysis of the outer model confirms that the survey items measure the constructs they were designed to measure, thus ensuring that they are reliable and valid.

Table 4 Reliability Test Results

Variable	*Item Code*	*Loadings*	*Indicator Reliability*	*Cronbach's Alpha*	*CR*	*AVE*	*Correlations Matrix**
Technology Orientation	TO1	0.89	0.75	0.87	0.91	0.76	0.871 (0.370-0.636)
	TO2	0.87	0.78				
	TO3	0.80	0.79				
	TO4	0.79	0.77				
	TO5	0.88	0.80				
Innovation	INN1	0.91	0.79	0.88	0.90	0.70	0.836 (0.523-0.639)
	INN2	0.89	0.77				
	INN3	0.86	0.78				
	INN4	0.88	0.79				
	INN5	0.89	0.79				
	INN6	0.90	0.74				
	INN7	0.85	0.76				
	INN8	0.89	0.77				
	INN9	0.88	0.73				
	INN10	0.87	0.74				
Competitive Advantage	CA1	0.94	0.90	0.88	0.91	0.74	0.860 (0.370-0.523)
	CA2	0.90	0.89				
	CA3	0.88	0.88				
	CA4	0.89	0.91				
	CA5	0.87	0.90				
	CA6	0.85	0.85				
	CA7	0.89	0.87				
Technology Turbulence	TT1	0.87	0.89	0.85	0.89	0.69	0.830 (0.321-0.596)
	TT2	0.89	0.86				
	TT3	0.90	0.88				
	TT4	0.88	0.89				
	TT5	0.87	0.85				

* Correlation matrix column includes squared root AVE and correlations in brackets.

The two primary factors utilized in PLS-SEM analysis to assess the outer model are validity and reliability. (Hair Jr. *et al.*, 2013; Hulland, 1999; Ramayah, Lee, & In, 2011).To establish the reliability and validity of the

latent variables and their items in the outer model, first, the individual item reliability, Cronbach's alpha and composite reliability were above the recommended 0.60/0.707 criterion (see Table 4), which indicates that items were performing well in capturing latent variables (Chin et al., 1998). Second, the Average Variance Extracted (AVE) was above the recommended 0.50 threshold (see Table 4), which indicates that for every latent variable more than 50% of the variance was explained (Vinzi et al., 2010). Third, the convergent and discriminant validities were above the recommended 0.707 minimum loadings value (see Table 4), which indicates that all latent variables were strongly correlated with their own items, and at least 50% of the variance was shared with the latent variable (Barclay et al., 1995). At the latent variable level, the comparison of each latent variable squared root AVE and its correlation suggested that there is satisfactory discriminant validity since the square root AVE for each latent variable exceeded the respective latent variable correlations with any other latent variables in the outer model and there are low correlations between latent variables (Chin et al., 1998).

Structural Model

The structural model consists of three latent variables. To estimate the parameters in the inner model, a bootstrapping procedure with 200 and 500 re-samples consisting of the same number of cases as the original sample (that is, 200) was applied to assess the quality of the estimated structural model parameters (Vinzi et al., 2010; Barclay et al., 1995). Individual sign change options were used to address potential modifications in signs.. The goodness of the conceptual model was established by the strength of each structural path and the combined productiveness of its independent latent variables (Vinzi et al., 2010).

Table 5

Hypot heses	***Path***	***β- val ue***	***T - v al u e***	***p- va lu e***	***r 2***	***f 2***	***Q 2***	***Decisi on***
H1	TO →CA	0.471	4.765	0.001	CA = 0.751	0 .23 0	CA = 0 .36 0	Suppo rted
H2	TO INN →. CA	0.693	5.89 7	0.000	INN =	0 .16 9	INN =	Suppo rted
H3	TO*TT → CA	0.327	3.98 5	0.001	0 .48 3	0 .15 8	0 .26 9	Suppo rted

Table 5 illustrates the findings that indicate a causal relationship between competitive advantage and technological orientation (H1). The results showed the significant and positive relationship between technology orientation and competitive advantage (t=4.765, p=0.001). Thus, H1 was supported.The present study supported the study by Urban & Barreira, 2009; Binneman & Steyn, 2014; Liu &Su, 2014; Halac, 2015; Ibrahim & Shariff, 2016, which reported the positive influence of technology orientation on competitive advantage. Similarly, the current study's findings demonstrated innovation's strong and beneficial role as a mediator in the relationship between competitive advantage and technology orientation (t=5.897, p=0.000)., which supported H2. These findings resembled with the findings of the study by Yousaf et al., 2020 on the importance of innovation as a mediator in the relationship of technology orientation and competitive advantage. Besides that, technology turbulence was found to exhibit significant and positive influence as a moderator on the relationship between technology orientation and competitive advantage (H3) (t=3.985, p=0.001). These findings were found to be consistent with the findings reported by Teece (2019) on the important role of the technology turbulence as a moderator in describing technology orientation towards achieving competitive advantage.

Next, effect size (f 2) was calculated according to the criterion suggested by Sarstedt, et al.,2017): the value of effect size can be substantial (Above 0.35) , medium (0.16 to 0.35) , or small (0.02 to 0.15). Table 5 presents the results of effect size. The f 2 value of around 0.35 showed that all constructs in this study had medium effect size on competitive advantage. Hair et al. (2014) state that by reconstructing the parameter estimates, the blindfolding technique shows how the values of constructs are well-observed. The use of this process is limited

to endogenous constructs that have reflective indicators. The predictive relevance of a model in this study was collectively calculated using the predictive relevance (Q2) of all factors at the individual level (single factor). Referring to Table 5, the obtained results of the blindfolding procedure revealed substantial predictive relevance of the model at 0.360%, confirming the integration of the predictors of competitive advantage. Therefore, all exogenous variables exhibited a medium level of predictive relevance with the respective endogenous variables.

IV. Conclusion & Suggestions:

With innovation and technological turbulence serving as mediators and moderators, respectively, of SMEs in the emerging tech Indian market, this study investigated the effect of technology orientation on competitive advantage. As has been noted for these markets, the results show that innovation has a strong positive impact on competitive advantage in emerging markets, and technology orientation has a significant positive connection with innovation. These findings confirm all three hypotheses. Additionally, this study discovered that technology orientation has a direct and substantial impact on competitive advantage, including excellent technology to set innovative products apart.

The present research supported the findings of Park and Zhang's 2022 study, which emphasized technology as a potent element of social elements and new information and communication. By taking use of the advantages that technologies provide, businesses can increase their competitiveness and sustainability. Adopting new technologies also gives SMEs a competitive edge and promotes economic sustainability. Furthermore, this study demonstrated the important role that technological orientation, competitive advantage, and innovation play. Therefore, technology orientation determines how much attention is placed on innovation, which in turn affects competitive advantage, especially in a developing market like India. Numerous conclusions about the significance of technology orientation, innovation, and competitive advantage within SMEs can be drawn from the findings. According to Mukhsin and Suryanto (2022), technology orientation (external resources) plays a critical role in helping SMEs gain a competitive edge by encouraging innovation and creativity among business owners in times of turbulence.

Indian SMEs with an IT foundation have a favorable attitude toward technology, which greatly influences their ability to innovate." This result is in line with earlier research (Humphreys et al., 2005). According to the findings, SMEs in India are likely to use technology to support their innovative endeavors. They have also come to understand the importance of adopting new technology and implementing technology policies in enhancing their internal procedures and methods, which encourages them to invest in the newest technologies to foster innovation. Accordingly, SMEs' use of technology may be regarded as innovative behavior (Cumming et al., 1998). The results of the current study added to the strategic literature by demonstrating the substantial impact of innovation on competitive advantage. Because of the more chaotic environment, there is a lot of uncertainty regarding competing plans, which affects competitive advantage. This study attempts to understand competitive advantage under technological turbulence by embracing innovation and a critical strategic orientation, or technology orientation.

Suggestions/ Implications

First of all, this study extends the literature of resource-based view by proposing a model that concerns a combination of technology orientation and innovation as the primary determinant of competitive advantage during times of technology turbulence. We argue that technology orientation is a resource necessary to enhance the innovative capability of firms. The competitive strategy has developed a different theory of how firms develop competitive advantage by assembling resources from various stakeholders. Many economists pay too much attention to the role of the market structure supporting innovation, called a Schumpeterian debate (Teece, 2019). According to Polys et al. (2018), products, hardware, and machines can perform better with the use of cutting-edge graphic and animation technologies, software program upgrades, and planning models. To maximize its competitive advantage, a company that relies heavily on technology must be able to both predict and guarantee technological advancements for use in its goods and services. The information technology sector of developing economies like India ought to pay attention to technology orientation in order to secure competitive advantage. It is a matter of fact that competitive advantage mainly relies on the new thinking in information technology/software houses for which the firm should be equipped with innovative skills (Pratono, 2016).

Technology-driven firms offer the most recent news and information about the industry while maintaining an intense concentration on R&D procedures to enhance their own firms' innovativeness (Ockwell et al., 2015).. The technology-related organizations like software houses need to always look forward to gathering innovative information and subsequently store it with the help of a hefty budget in R&D and directly invest in new technology that will result in good organizational financial performance henceforth competitive advantage (Roztocki and Weistroffer, 2015). The technology orientation creates strong foundations for the development of core competence, separates products, and promotes enterprises' technological capacities for

advancing technology (Lee et al., 2015). The core competence may result in high profitability and stronger competitive advantage provided that it is implemented in the proper direction as well as at the proper time. The first mover firms may enjoy the attention of customers and develop long-term relations with the customers that will ensure their competitiveness as well as performance.

This paper reports that if the turbulence in the business environment is technological, the SMEs will fare better by adopting technology orientation. In an unpredictable and uncertain business environment, the wide variety of information becomes not valuable as firms fail to understand and identify different kinds of knowledge (Wang and Fang, 2012). The balance between controlled resources and dynamic capabilities comes to a challenging question, as there is risk of a failure in development of resources to firm capabilities (Huesch, 2013). SMEs need to understand the stage of competitive advantage as well as their capability to manage an innovation under high environmental turbulence, since many firms are short lived (McGrath, 2013). If SMEs allocate their resources in an ambitious and innovative manner, they could see improved performance (Klingebiel and Rammer, 2014). SMEs may make substantial investments in R&D through utilizing radical technological turbulence (TT), but may pursue inferior technology to leverage their assets (Wu et al., 2014). The technology turbulence allows the observed SMEs with opportunity-based strategic posture to achieve their performance. This condition indicates that under predictable technological change, the SMEs can utilize technology to innovate and implement their strategy. The finding should encourage SME managers and policy makers to pay concern in technological capability by adopting technology oriented strategies and constant innovations that will allow SMEs to gain competitive advantage.

Conclusion

This study looks at how technology orientation encourages innovation among Indian SMEs. It supports earlier research conducted in different markets and offers helpful insights on innovation and SMEs' competitive advantage in the fiercely technologically competitive IT business. The findings show that SMEs' attitudes and behaviors toward innovation in the technology-based marketplace are influenced by their technology orientation, and that innovation mediates the relationship between technology orientation and competitive advantage in periods of technological upheaval. Therefore, in order to thrive in extremely volatile situations, entrepreneurs must be capable, keep up with technology advancements, and put strategies and innovations into practice.

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