BIG DATA ANALYTIC CAPABILITY AND ENTREPRENEURIAL ORIENTATION AS DRIVERS OF FIRM PERFORMANCE: THE MEDIATING INFLUENCE OF BUSINESS MODEL INNOVATION

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ABSTRACT

With big data analytics capabilities and entrepreneurial orientations rapidly growing popularity in research for researchers and practitioners have considered them as valuable resources and they can incorporate these technologies to bring it into their competitive strategies. Drawing on recent literature on big data analytics capabilities, entrepreneurial orientation, the resource-based view (RBV) and the dynamic capabilities view (DCV), the study explores how big data analytics capability (BDAC) and entrepreneurial orientation (EO) empower firms to identify opportunities, make informed decisions and sustain competitive advantages and observes the direct and mediating relationship among the big data analytics capability (BDAC), entrepreneurial orientation and SMEs performance with intervening role of business model innovation(BMI). This study proposes that the existing research having big data analytics capability (BDAC), entrepreneurial orientations (EO) that enable the organizations to generate insight that can help and strengthen their business model innovation, and have positively effect on their performance. For testing the proposed research model, a quantitative approach by utilizing partial least squares structural equation modeling (PLS-SEM), was employed to analyze the data collected from managers and owners of SMEs through survey working in Punjab Pakistan. The findings of the study confirm the assumptions regarding the direct and mediating effect that BDAC and entrepreneurial orientation have on SMEs performance.

Keywords: big data analytics capability (BDAC), entrepreneurial orientations (EO), business model innovation (BMI), SMEs, PLS-SEM.

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1. INTRODUCTION

Big data analytics capability, or BDAC, is becoming a popular subject for academics and professionals. According to Fosso Wamba et al. (2015), BDAC is a wide-ranging method for managing, processing, and assessing the data-related dimensions i.e. the five V's (volume, variety, velocity, veracity, and value) in order to produce effective theories for producing long-term value, evaluating performance, and creating competitive benefits. According to Manyika et al., (2011) certain practitioners and academics have called BDAC "the next frontier for innovation, competition, and productivity", the "fourth paradigm of science" (Strawn, 2012) or a "new paradigm of knowledge assets" (Hagstrom, 2012) or as Manyika et al. (2011) put it, "the next frontier for innovation, competition, and productivity." Market-based policies are becoming more prevalent in developing nations in an effort to boost economic growth and end poverty. The small and medium sized enterprises (SME) are becoming increasingly vital for economic growth, stability, and reduction in poverty due to their meaningful participation in economic activities (Asad and Kashif, 2021). Furthermore, due to dynamic environment in developing economies, the SMEs must adapt to structural changes (Abkenar et al., 2021). In these circumstances, businesses must modify their decision-making approaches in light of available market data. As a result, these businesses must take the initiative to make judgments based on accurate data obtained using big data analytics (BDA). The aforementioned claims are principally motivated by the widespread acceptance and utilization of BDA-enabled infrastructure, tools, and technologies, such as mobile devices, social media and internet of things allowing automatic identification technologies and cloud-enabled platforms, for businesses to attain and maintain competitive advantage. BDA, for instance, enables better data-driven decision making and creative methods of learning, organizing, and renovating (Yiu, 2012: Kiron, 2013). This improves operational risk management, supports customer relationship management, and

improves operative efficiency and results in improved organization performance (Kiron, 2013). SMEs in Pakistan, however, are hesitant to use big data analytics, maybe because they are unaware of the possible advantages that big data analytics could provide them. As a result, SMEs' performance and growth are below average when measured against global growth norms (Agnes et al., 2019). The main causes of the SME collapse are their outdated business practices and entrepreneurs' ignorance of the modern business techniques used by SMEs in both developed and developing nations. The primary cause of sticking with conventional methods is a deficiency of entrepreneurial orientation, or EO (Asad et al., 2021). Businesses need to become more entrepreneurial if they want to survive in the highly competitive global marketplace. The lack of entrepreneurial orientation (EO) and big data analytics deployment is primary cause of owners' distrust. The customer-driven demand's significance can be shifted through differentiation to meet the demands of global competitiveness, is rarely understood by Pakistani SMEs' owners. Therefore, it is impossible to dispute the significance of EO for SMEs (Asad and Shabbir, et al., 2018). Nevertheless, research has shown that EO significantly improves performance (Haider, Asad, & Fatima, 2017; Anwar & Shah, 2020), although other researchers have contradicted this finding and suggested that EO has a negative (Harms et al., 2010), U-shaped (Kreiser et al., 2013), or curvilinear (Yoon and Solomon, 2017). Finding the intervening component that contributes to relationship inconsistencies is therefore necessary.

In addition to EO, big data is becoming a more important aspect in today's environment. In today's digital age, data is becoming increasingly important. Digitalization is becoming essential due to rising sales and client numbers (Dong and Yang, 2020). However, in contrast to other resources, BDA is useless without the instrument that allows for the extraction of more profound meaning from huge data (Akter and Wamba, 2016). In the modern world, businesses are led to great success by entrepreneurs who are the most knowledgeable and possess an exceptional comprehension of data set benchmarking (Bag et al., 2020). BDA will be the driving force behind businesses in the future (Ferraris et al., 2019). For obtaining competitive edge and improvement in performance, SMEs in developing economies therefore make investments in cutting-edge technologies. It would therefore be appropriate to contend that SMEs managing their operations in an entrepreneurial manner using data obtained from BDA may outperform competitors by taking advantage of business model innovation. Thus, it would be appropriate to argue that business model innovation is the piece lacking from the total performance of SMEs

and the combined efforts of the two resources: big data analytics capability (BDAC) and entrepreneurial orientation (EO). Therefore, the goal of the current study is to determine mediating function BMI between big data analytics capability (BDAC), entrepreneurial orientation (EO) and PSMEs.

The project specifically intends to investigate the following research questions: i. How are BDAC capabilities assessed, and is the performance of the company affected by their overall application? ii. How is the performance of the firm linked to EO? iii. Does BMI act as a mediator in the interaction of EO, FPER, and BDAC?

This study makes use of the resource-based view (RBV), dynamic capabilities view, EO, and developing literature on BDA capabilities for answering these research questions. In the past ten years, the resource-based view (RBV) of the company has drawn significant interest from the domains of organization theory, economics, and strategy management too (e.g. intellectual capital). The RBV is based on the idea that a firm's success is mostly dictated by the resources it owns and controls. This theory in the literature was originally proposed by Wernerfelt in 1984. Normally, resources are described as either capabilities or assets. Collis (1994) argued that two types of assets i.e. either tangible or intangible the company owns and controls. Intangible collections of knowledge and skills which are exercised by organizations in routines are known as capabilities (Teece et al., 1997; Nelson and Winter, 1982). According to the empirical knowledge Barney, (1991), company resources play a significant role in a sustained and improved firm performance if they have a few unique qualities. The RBV is therefore prescriptive. In other words, the primary recommendation of the Resource-Based View is that greater performance can only be accrued through the use of rare, non-replaceable, valued and unique resources.

2. LITERATURE REVIEW AND HYPOTHEIS DEVELOPMENT

2.1 Big data analytics capability and firm performance:

Big data analytics capabilities have considered acute capabilities for firms to remain in a competitive environment in the digital economy. To uncover the valuable insights for the firms

that can inform planned decisions, optimize operations, and personalize customer experiences, can obtain from the ability of big data, it also help the firms to be better positioned to streamline their operations, reduce waste, and optimize resource allocation. With the analyzing capability of huge volume of collected data, the business organizations can easily point out to identify blocks and deficiencies in their operations and suggest the solutions to address them to enhance efficiency for the improvement in firm performance (Davenport, 2013).

The big data analytical capability support the organizations for making planned and informed decisions making for the betterment of the operation, and ultimately for improving performance which previously were ignored or unapproachable. With the help of analyzing capability of collected large data the firms can easily forecast trend, know the customers demand and make feasibility for targeting the products and market and ultimately to superior performance and outcomes (Brynjolfsson, Hitt, & Kim, 2011). The cumulative impact of better decision-making and improved operational efficiency results in improvement in firm performance. By leveraging big data analytics firms can enhance their performance through targeting market, better pricing or competitive pricing and developing new revenue streams (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012). Based on these observations this study suggests this hypothesis.

Hypothesis: 1. Enhancement of big data analytics capabilities within firms significantly improves its overall performance.

2.2 Big Data Analytics Capability and Business Model Innovation

The adaptability of innovated business models in current business settings is important for sustainability in market competitive edge, in response to change in market dynamics. In this context, the growth of big data analytics capability is a vital enabler, making firms required understandings about the adoption of innovative business models successfully. The theory about this hypothesis is that the BDA capabilities not only provide huge amounts of data analyzing ability, also trained the firms with the necessary analytical tools to develop understandings to lead to innovative business models (Zott, Amit, & Massa, 2011). With the use of BDA, firms gain knowledge to analyze the customer trends, preferences and behaviors and sense and seize of opportunity with adoption of innovation required. This kind of knowledge makes companies to

modify their offerings, anticipate customer needs that lead to the development of customer expectations aligned propositions (Bharadwaj et al., 2013).

With the use of BDA, firms become able to identify their operational and supply chain inefficiencies which lead to operational improvements and cost savings significantly. Fundamentally the innovations can suggest altering the current business models into more innovative and competitive business models for creating and delivering values to their customers for taking business edge from competitors. (Porter &Heppelmann, 2014). The information obtained from big data analytics can expose unexploited customer segments, preferences, expectations, leading to market opportunities. This information is sufficient for firms to alter their business models, to enter into new markets to avail new available opportunities to fulfill customer's demand and give him value. (Davenport, Barth, & Bean, 2012). Resource-Based View (RBV) suggests that the firm's capabilities and resources for achieving competitive advantages are vital. BDA capabilities are seen as unique resources as suggested by (RBV) which enable a firm to innovate its business model in such a ways that is difficult to copy for rivals (Barney, 1991). Additionally, to address rapidly changing environments that is critical for innovative success, can be achieved with firm's ability to build, integrate and reconfigure their competences suggested by Dynamic Capabilities Theory (Teece, Pisano, &Shuen, 1997). From the above observations following hypothesis is developed.

Hypothesis: 2. The integration and advanced utilization of big data analytics (BDA) capabilities significantly foster business model innovation.

2.3 Business Model Innovation and Firm Performance:

In rapidly changing markets environment, the firms maintaining and sustaining their competitiveness through business model innovation (BMI). Business model innovation (BMI) defines the way for businesses to capture, create and deliver value through products innovations and focus on incremental improvements leading to the improvements in firm performance, as it often results in more adaptable business practices (Amit & Zott, 2012). Business model innovation differentiates the firms from their competitors, with a unique positioning in the market. As the firms offer something unique that is not easily duplicated by the opponent results

in improved competitive advantage i.e. improved financial performance and it differentiates from others. According to Barney, (1991) as suggested in the Resource-Based View (RBV), that uniqueness in resources and skills lead to achieve enhanced competitive edge and growth in performance. Aligning with Dynamic Capabilities view Theory, which highlights the significance of a firm ability to reconfigure its resources in a changing environment this not only enhances performance in terms of cost savings but also offers organizations to familiarize more quickly to market changes (Teece, Pisano, &Shuen, 1997).

With the help of adapting Business model innovation the firms explore and enter in new target markets that were previously untouched and contribute to improved performance. (Kim & Mauborgne, 2004). Entrepreneurial innovation play a vital role in new combinations of prevailing resources and capabilities, in creating new industries and transforming existing ones (Schumpeter, 1942). Business model innovation offers new ways to organize and utilize resources, to serve and value customers lead to improved firm performance.

Hypothesis:3. Business model innovation positively impacts firm performance.

2.4 Mediation Impact of Business Model Innovation Between Big Data Analytics Capability (BDAC) and Firm Performance.

Based on the knowledge gained from big data analytics capabilities, the firms not only collect and analyze data but also adapt their business models to value their customers in the current turbulent market situations. The adaptation of innovative business model is vital for achieving and sustaining superior firm performance. The understanding of mediating role of business model innovation (BMI) in the association between big data analytics capability (BDAC) and firm performance is supported and grounded on the Theoretic contribution of Dynamic Capabilities view and Resource-Based View (RBV) Theory. The attainment of competitive advantage mainly depends on firm's capabilities and resources that make it unique from competitors, according to RBV theory (Barney, 1991). Big data analytics capability (BDAC) is a valuable and unique resource that provides information for innovation. However, only having big data analytics capability cannot assurance for improved performance, it also depends on the

adaptation of innovative business model acting as mediator between BDAC and firm performance to create a sustainable competitive advantage.

To adapt rapidly changing environments, depends on firm's ability to integrate, build, and reconfigure external and internal competencies emphasized by Dynamic Capabilities theory (Teece, Pisano, &Shuen, 1997). New opportunities and threats identified and facilitated by big data analytics capabilities by analyzing large volumes of collected data. However, these opportunities can be seized through adapting business model innovations capability as mediator which leads to improved firm performance, supported by theory that high light mediating role of BMI through the conversions of BDAC into actionable strategies to enhance form performance. Innovation-Diffusion Theory Rogers (2003) suggested that the success of organizations depends on rapidly accepting new opportunity for innovation and diffusion of that innovation by adapting it within organization. Strategic decisions making through BDAC by utilizing collected data can be seen as an innovation i.e. BDAC as innovation. To determine the level of impact on firm performance of this diffusion of innovation within organization manifested through BMI.
Improved business models can be developed through the potential of BDAC in addition to the contribution in gained and optimized operations (Wamba et al, 2017; Bharadwaj et al., 2013). From these discussions it is suggested that BMI as a mediator in the relations between big data analytics capability and improved firm performance.

Hypothesis:4. The relationships between big data analytics capability (BDAC) and firm performance mediated by Business model innovation (BMI).

2.5 entrepreneurial orientation and firm performance:

Miller (1983) tested the same hypothesis in the field of strategic management i.e. entrepreneurial orientation effects on firm's performance. Miller conceptualized the Entrepreneurial orientation as organization's strategic management containing on pro-activeness, innovativeness, risk-taking and competitive aggressiveness. This theory supports that firms with advanced EO develop new opportunities, innovations in products and services, embracing risk and be active to response the market changes, leading to growth in firm performance.

This relationship is supported by many empirical studies. Lumpkin and Dess (1996) is one of these studies which found that EO and firm performance have a significant impact across the industries. Similarly, the measurement of firm performance also found that there is a positive impact between entrepreneurial orientation (EO) and firm performance (Wiklund & Shepherd, 2003). On the basis of these findings it is argued that firms can enhance their performance with the ability to adapt dynamic innovations and capitalizing opportunities in rapidly changing environments and perform better from competitors with having good EO capabilities and ultimately sustain their competitive advantage. Based on the literature supports observed above following hypothesis is developed.

Hypothesis:5. Higher levels of entrepreneurial orientation (EO) positively impact firm performance.

2.6 Entrepreneurial orientation (EO) positively impacts business model innovation:

Covin & Slevin, (1991) suggested that innovations, risk-taking pro-activeness and competitive aggressiveness are characteristics of the entrepreneurial orientation which provides the roots for that hypothesis. Teece, (2010) argumented that business model innovations create value and maintain competitive position through adoption of changes required in competitive market and change their business model for serving the customers in an innovative ways. EO also creates favorable environment for the adoption and developing new and unique business models for seizing the new opportunities and creating values.

Empirical studies suggested that firms having a robust entrepreneurial orientation (EO) are more likely to be considered to engage in the exploration and experimentation with different business models required for innovative activities (Wiklund & Shepherd, 2003). The firms continuously searching for innovations to create and deliver value to customers are often require the reconfiguration in business model that are encouraged dimension of entrepreneurial orientation (EO) i.e. pro-activeness. In addition to pro-activeness, the risk-taking dimensions of EO allow firms to take steps in innovating business models.

This hypothesis having encouraging relationship among entrepreneurial orientation (EO) and business model innovation demonstrated by several Empirical studies (Helfat & Raubitschek,

2000). Firms with higher levels of EO tend to exhibit greater The flexibility and adaptability in business model design, allow firms to rapidly respond to adapt the change in the market, technological advancements is possible having advance level of entrepreneurial orientation. Based on these observations this hypothesis is developed.

Hypothesis: 6. Entrepreneurial orientation (EO) positively impacts business model innovation (BMI).

2.7 Mediation Impact of Business Model Innovation Between entrepreneurial orientation and Firm Performance

(Covin & Slevin, 1991) suggests that Entrepreneurial Orientations, with its features of pro-activeness, risk-taking, competitive aggressiveness and innovation, motivates firms to use business model innovation (BMI) for serving customers, value creation and achieving sustainable competitive performance (Teece, 2010).

Higher levels of entrepreneurial orientation (EO) considered to engage in BMI activities suggested by empirical studies (Helfat & Raubitschek, 2000). The identification and exploitation of new opportunities are adopted by favorable environment supported by entrepreneurial orientation (EO) require innovative business model (Wiklund & Shepherd, 2003). Furthermore, the firms with risk-taking propensity aligned with EO take steps in innovating their current business models boldly, even in uncertain conditions. And in turn, business model innovations, has shown significant impact on firm performance (Teece, 2010). The organizations or firms can gain a competitive edge with the development of new and unique ways of delivering and generating value to customers and ultimately get growth in firm’s performance.

Therefore, one can reasonably expect from the empirical findings of the studies that business model innovations (BMI) can intervene the relationship between entrepreneurial orientation (EO) and firm performance. The firms get motivations from entrepreneurial orientation (EO) adopt business model innovations (BMI), by adopting business model innovations (BMI) firms get enhanced performance, with adapting change in market situations, getting benefits from emerging opportunities, and getting sustainability in competitive performance.

Hypothesis:7. Business model innovation (BMI) mediates the relationship between entrepreneurial orientation (EO) and firm performance.

3 Methodology

3.1 Sample and data

A questionnaire was designed on the base of previous literature. Then we consulted with several experienced owners and top managers for obtaining their suggestions about questionnaire. And we made modifications in questionnaire by incorporating the suggestions obtained there to ensure and reflect the conditions and context faced by organizations in Punjab Pakistan. Then, a pilot test was conducted with owners and top management of eight firms, and their data were excluded from the final analysis. The questionnaires were completed by the owners and managers and received reaction about design and wording of items. The questionnaire was further modified and refined by using feedback from the pilot test. We randomly selected 700 firms located in Punjab province based on number of employees. First, at least one top manager and owner of each selected firms was contacted by telephone inquiry to get higher response rate before conducting the formal survey. Then, face-to-face interview method was adopted for the collection of data. The face-to-face interview method for data collection is better than the mail or online surveys because it can clarify respondents' queries on the spot and avoid various problems about data collection. Finally, 459 firms in the 700 samples were responded the survey questionnaire and 80 of them were excluded due to inadequate completion of survey instruments.

3.2 Measures

All items were measured by using five-point scale, unless stated otherwise, in which "1" represents "strongly disagree" and "5" represents "strongly agree". We measured big data analytics capabilities by 7 items from Gupta and George's studies; entrepreneurial orientation was measured with 9 items adopted from Lumpkin and Dess (1996) and Covin and Slevin (1989). Business model innovation measured by 4 items from (Zott & Amit, 2007, 2008); and firm performance is measured bt five item from the studies by Prieto & Revila (2006) and Dansom et al., (2016).

4. Data Analysis and Results

4.1 Measurement validation

Table 1 describes characteristics of sample of 379 respondents that served as the basis for our study's findings. In particular, it includes 63.1% men, 44.1% between the ages of 35 and (56.6% between the ages of 36 and beyond), and 19.8% with more than 10 years of experience in the field (80.3% more than 1 to 5 years). Companies in the manufacturing (26.9%), service (49.1%), commerce (1.3%), and finance (22.7%) sectors provided responses.

TABLE 1 DEMOGRAPHICS

	Frequency	%
Gender		
Male	239	63.1
Female	140	36.9
Total	379	100.0
Industry		
Trade	5	1.3
Manufacturing	102	26.9
Services	186	49.1
Banks & Financial	86	22.7
Total	379	100.0
Age		
Less than 25	1	.3
25-35	167	44.1
36-45	137	36.1
46-& above	74	19.5
Total	379	100.0
Work Experience		
Less than 1 year	242	63.9
1-5 years	62	16.4
5-10 years	48	12.7
15-20 years	27	7.1
Total	379	100.0

We confirmed the internal consistency of the reflective constructs through the index value of Cronbach's Alpha which was higher than 0.7; the lowest recorded value i.e. 0.94 significantly surpasses this cutoff. Lastly, as suggested by Nunnally (1978) we also determined the reflective constructs' composite reliability and validity by verifying their values with regard to the minimum criterion of 0.70. Additionally, the saturation values of each item for the associated construct (outer loadings) and reliability (both formative and reflecting) was evaluated; the results values were above the 0.70 cutoff. These findings point out the items suitability of the

included indicators of constructs as well as the reflective constructs validity that we employed in our analysis.

TABLE 2 Descriptive Statistics & Reliability

	BDAC	EO	BMI	FP
Mean	3.409	3.419	3.466	3.518
Skewness	-0.547	-0.406	-1.004	-0.843
Maximum	5.000	5.000	5.000	5.000
Minimum	1.000	1.000	1.000	1.000
Cronbach's Alpha	0.955	0.960	0.941	0.952

investigate the nomological validity of our theoretical model, we employed the PLS technique, which has been applied to path-analytical models (Kock, 2019). We started by assessing the measurements' reliability and validity. Second, we assessed the strength of the proposed relationships between the variables by analyzing the structural model. Through an evaluation of average variance extracted (AVE) and discriminant validity, we have additionally evaluated each construct's psychometric qualities within the framework of the structural model (refer to Table 3). We found that the average variance extracted (AVE) is larger than 0.5 and that all of the individual factor loadings are greater than 0.5 (see Table 3). Therefore, we can presume that our theoretical model has convergent validity (Fornell and Larcker, 1981). Therefore, we verify that our model's constructs have adequate discriminant validity. All things considered; we can say that our constructs have adequate construct validity.

TABLE 3 Loadings of the indicator variables (Average Variance Extracted)

	Rotated component matrix			
Items	1	2	3	**4**
BDAC1		.807		
BDAC2		.809		
BDAC3		.828		
BDAC4		.803		
BDAC5		.811		
BDAC6		.761		
BDAC7		.814		
EO1	.784			
EO2	.801			
EO3	.782			
EO4	.797			
EO5	.660			

EO6	.769		
EO7	.607		
EO8	.867		
EO9	.862		
BMI1			.817
BMI2			.813
BMI3			.798
BMI4			.814
FP1		.836	
FP2		.856	
FP3		.818	
FP4		.849	
FP5		.777	

4.2. Structural model results

Table 4 summarizes the structural model from PLS analysis by displaying the explained variance of endogenous variables along with the standardized path coefficients (β) and their significance (t-values). FP: Firm Performance 95% Confidence Interval; EO: Entrepreneurial Orientation; BMI: Business Model Innovation; and BDAC: Big Data Analytics Capabilities. Using 379 samples, a 15% confidence interval was bootstrapped. *** $p < 0.001$.

All of our hypotheses are supported by the results. The hypothesis is validated that BDAC has a significant and beneficial effect on BMI ($\beta = 0.114$, $p < 0.001$). The hypothesis is confirmed: EO has a significant and favorable impact on BMI ($\beta = 0.558$, $p < 0.001$). FP exhibits a noteworthy and favorable direct impact from BMI ($\beta = 0.630$, $p < 0.001$; hypothesis validated).

The hypothesis was confirmed by the mediating results, which showed that the BDAC → BMI → FP mediation path was likewise positive and significant ($\beta = 0.72$, $p < 0.001$). The hypothesis was confirmed when the EO → BMI → FP mediation path was likewise found to be positive and significant ($\beta = 0.352$, $p < 0.001$).

TABLE 4 Structural model results

	Estimate	S.E.	P Value
Direct Effects			

BDAC → BMI	.114	.046	.013
EO → BMI	.558	.050	***
BMI → FP	.630	.043	***
Indirect Effects			
BDAC →BMI → FP	.072	.039	.047
EO →BMI → FP	.352	.043	.010

5. Discussion, limitations and future research

This research was conducted to study the influence of big data analytics capabilities (BDAC) and entrepreneurial orientation on SMEs' performance directly and also with intervening role of business model innovation (BMI). The previous studies have sufficiently contributed to the literature of BDAC, entrepreneurial orientation and SMEs success (Anwar & Shah, 2020; Khan et al., 2019; Adomako, 2018; Jiang et al., 2018; Su et al., 2015). Moreover, this research study uncovers the nature of association among big data analytics capabilities, entrepreneurial orientation and SMEs' performance and also finds out how the business model innovation (BMI) influences this relationship. The empirical evidence of this study was collected from Punjab Pakistan SMEs to analyze the direct hypothetical relations among the big data analytics capabilities, entrepreneurial orientation and firms' performance, and also the indirect mechanisms of BMI which affected this relationship as well. The outcomes of the current study revealed a proposed significant direct relationship among big data analytics capabilities (BDAC), entrepreneurial orientation and SMEs performance, which aligned with the studies of (Galbreath, Lucianetti, Thomas, and Tisch 2020; Anwar et al. 2018;). The results are also aligned with previous studies (Asad et al., 2021), where the Entrepreneurial Orientations and BDAC as a the part of strategic management to analyze, manage and interpret the data, collected from market to take accurate and quick decisions, which play an active and development role for organizations to enhance performance of SMEs (asad et al., 2021; asif et al., 2021; asad & shabbir et al., 2018).

Findings also showed a significant positive link between big data analytics capabilities (BDAC), entrepreneurial orientation (EO) and business model innovation (BMI). Bouncken et al. (2016) also argued that entrepreneurial orientation strengthen the business model innovation (BMI) in a turbulent market (Asemokha et al. 2019). The entrepreneurial behaviors have a significant impact on business model innovation (BMI) (Futterer et al. 2018). Hence, the finding of this study revealed that SMEs having big data analytics capabilities (BDAC) and entrepreneurial

orientation (EO) build more effective business model innovation (BMI). Business model innovation has a vital role to enhance the performance SMEs, operating in a emerging economy like Pakistan (Anwar et. al., 2018).

This study finding provides direction to managers and owners for implementing entrepreneurial orientation and adapting BDAC in firms. Business model innovation's mediating role also highlights how BDAC and entrepreneurial orientation in uncertain environments can be exploited as a source of competitive advantage. By the findings of the current study, we can consider and conclude that business model innovation does mediate the relationships among big data analytics capabilities (BDAC), Entrepreneurial orientations (EO) and SMEs Performance. Additionally, the indirect impact of business model innovation (BM) has been proved. This research also extended resource based view (RBV) over the developing economy like Punjab Pakistan and to test it on the performance of SMEs where big data is a new resource to adopt. By introducing the mediator in the model, it has also increased the descriptive power of the model. The independent variables were the basis of variation in Performance of SMEs, but this is also caused by crafting a business model innovation. The outcomes are significant for the success of SMEs. It is also helpful for the regulators to convert the minds of owners for the implementation of BDAC to gain maximum benefits and also conduct trainings for entrepreneurially oriented SMEs.

This study also includes some limitations, data was collected from SMEs working in Punjab Pakistan only that was sufficient for PLS-SEM structural equation modeling; however for generalizability of findngs larger data set mean all over the Pakistan is suggested to collect and test it for future research. Moreover, to know why SMEs owners are hesitant in implementing BDA despite its advantages, conduct interviews and analyses it qualitatively. This research study examined the influence of big data analytics capabilities, entrepreneurial orientation (EO) on SMEs' performance with mediating role of business model innovation (BMI). However, other capabilities which are recently reported vital in the SME's sector can be beneficial to check it in future study. For instance, it is suggested for future researchers to examine the role of dynamic capability and entrepreneurial bricolge for obtaining better organizations performance.

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