

Impact of Big Data Analytics on Firm Performance with Mediating Role of Decision-Making Performance and Innovation Capability

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Big data analytics is emerging as a game changing capability which generates valuable insights and reveals new patterns to keep organizations up-to-date and plan their moves accordingly. This research study is aimed at exploring the impact of big data analytics competency on firm performance and those underlying resource dimensions which drives the high level of BDAC. Empirical results, based on a quantitative analysis of such firms which are practicing big data analytics in their units; specifically of telecommunication and banking corporations across Pakistan, identify that performance of a firm significantly increases when higher level of big data analytics competency is developed and that the decision-making performance and innovation capability mediate this relationship. In addition, findings of the current study demonstrate that a positive and a significant relation is present between big data analytics competency and firm decision-making performance such that higher level of big data analytics competency would make firm decision-making performance better. The study, therefore, significantly contributes to the domain of managing big data analytics and firm's performance. This study draws the attention of researchers as well as practitioners to consider the behavior of decision-making performance and innovation capability in this association while suggesting the potential for future researchers to explore this relationship with possible moderators like top management support, employees' commitment, and/ or readiness for change.

Keywords: *Big Data Analytics Competency, Decision Making Performance, Innovation Capability, Firm Performance*



1. INTRODUCTION

In this era of digital devices, every single action taken around is transforming into some form of data. International Data Corporation has predicted that “everyone will be a data-provider” by 2020 (IDC, 2018). According to 2018 IWS report (Internet World Stats, 2018), over 4.15 billion internet users were recorded globally by the end of December 2017, which makes 54.4 percent of world population. Out of this marked population of internet users, 71 percent is reported as social networks user (Statista, 2018) and there is a strong indication of major escalation further. Thus, the rapidly increased usage of digital devices such as laptops, tablets, smart phones, smart watches etc. creates bulks of data every single day which eventually makes the data more complex and consequently led towards an era of “Big Data Analytics” (Bhimani & Willcocks, 2014).

In today’s age where the world has transformed into a digital globe and waves of big data have spread all around, firms in every sector are heavily flooded with data. These tides of big data can be brilliantly exploited to provide an extensively deep understanding of valuable insights, to improve productivity, brings innovation and achieve competitive edge over its peers using the right organizational resources and tools (Davenport & Kudyba, 2016; Morabito, 2015).

It has been observed through the existed literature that BDA is posing its strong impact not only on a single industry but across number of various businesses. The present research however, targets the telecommunication and banking industry of Pakistan and analyze the influence of big data analytics competency on firm performance in terms of market and operational performance which is in line with the research study conducted by Gupta and George (2016); whereas authors stated that big data analytics is yet an evolving domain and a number of possible resource dimensions can be included to analyze the more delineated impact of BDAC. The present study thus attempt to bridge this gap by adding some more constructs such as data quality, bigness of data and domain knowledge (M. Ghasemaghaei et al. 2018) in combination with types of data used, technology adopted, commitment to basic resources, proficiency of technical and managerial skills and development of data-driven culture (Gupta & George, 2016).

Furthermore, prior literature mainly analyzed the direct effect of BDAC generated on firm performance (Collymore et al., 2017; Song et al., 2018) or on organization decision making performance (Banica & Hagi, 2016; M. Ghasemaghaei et al., 2018). However, it is argued that big data analytics improves business performance directly as well as indirectly through decision-making and that a research study investigated the effect of BDA on business performance with moderating behavior of decision making performance has shown positive result (Thirathon et al., 2017). However, previous literature have revealed that role of organization decision making performance with respect to its quality and efficiency has also been examined as a mediator in studies to investigate the firm performance (Carmeli et al.,

2009; Nuhu & Bin Ahmad, 2017). This drives the motivation for current study to investigate the mediating role of decision-making performance in relationship between BDAC and firm performance.

Moreover, existed literature in domain of big data analytics has revealed that researchers have attempted to analyze the influence of BDAC on firm performance with number of mediating factors like operational performance (Garmaki et al., 2016), market performance, customer satisfaction (Raguseo & Vitari, 2018), dynamic capabilities (Wamba et al., 2017) etc. Past studies claim that dynamic capabilities and innovation capabilities of a firm, both offers a significant role and common characteristics (Breznik & D. Hisrich, 2014) in bringing innovation and enhancing firm performance which is among the primary objectives of big data analytics. This therefore leads the interest of current research study to be more specific and analyze the mediating behavior of innovation capability in association between BDAC and its influence on firm performance. Though, the mediating impact of innovation capability has already got examined in different studies to analyze the firm performance (Gebremichael & Renyong, 2015; Naala et al., 2017; Yang, 2012); however, to assembled knowledge, there has been no evidence found in previous literature pertinent to examination of innovation capability as a mediator in this context; this thus offers a gap for the current study to explore.

In an endeavor to cover the identified research gap, under mentioned research questions are designed in the selected area:

- 1) Is BDAC associated with firm performance?
- 2) Is BDAC associated with decision making performance?
- 3) Does decision making performance mediate the relation between BDAC and firm performance?
- 4) Does innovation capability mediate the relationship between BDAC and firm performance?

2. LITERATURE REVIEW

IS researchers have distinguished a number of organizational resources which when assembled and exploit together, generate high IT competencies giving organizations an edge of competitive advantage (Seddon, 2014; Tallon & Carroll, 2008; Watjatrakul, 2005). Big data analytics has been emerged as one of the multifaceted IT capabilities and is defined as the firm's integration and deployment of its big data-specified resources to make it capable of conducting a methodical and action-oriented analysis of detailed data (Gupta & George, 2016); where how well all the resources are coordinated and assembled determines its impact on firm performance since each element offers its unique role in the formation of this capability (Ghasemaghaei et al., 2018). Though BDA is IT-driven domain, yet IT-specified resources alone are not enough to be profoundly benefited from big data, the effective managerial and organizational skills plays an equal part too in developing an unmatched firm competency

(Y. Wang & Hajli, 2017). Number of organizations have adopted the practices of big data analytics however some are yet in their adoption phase; this drives the fact that area of big data analytics is still developing and researchers have suggested that more data specified resource domains are needed to explore to enhance big data analytics competency of firms (Gupta & George, 2016).

Based on Resource Based Theory, it is believed that competition among organizations develop based on resources which are rare in nature, hard to imitate, valuable when exploit and are properly organized (J. Barney, 1991). Making an addition to it, Grant classified organizational resources as: (1) tangible, (2) intangible, and (3) human resources. Tangible are those resource which can be considered as an asset and can be bought or sold; Intangible are those which are not physical in nature such as knowledge-based resources while human resources include employees' trainings, skills, relationships, experiences etc. (Grant, 1996).

Resource Based Theory is one of the mostly used theories in organizational settings which describes, elaborates and anticipates organizational relationships (J. B. Barney, Ketchen, & Wright, 2011). Given that, RBT highlights the clear dependency of firm performance on its resources (Wade & Hulland, 2004). Keeping in line with the existed IT capabilities related studies and big data relevant literature, a number of big data specified resources such as data, technology, basic resources, technical analytics skills, managerial skills, data-driven culture (Gupta & George, 2016), bigness of data, domain knowledge (Maryam Ghasemaghaei et al., 2018) and data quality (R. Y. Wang & Strong, 1996) have been encircled to analyze the BDAC of an organization. Additionally, following Grant's classification of resources data, technology, basic resources are classified as tangible, bigness of data, data quality, data-driven culture as intangible while technical analytics skills, managerial skills and domain knowledge as human resources.

Data serves information as a raw material while information serves knowledge as a raw material thus data itself is unrefined and unfiltered information (Liew, 2007). It has been found that firms which integrate their internal data with external data for decision making are more credible to achieve competitive advantage comparative to those who rely merely on internal data as integration of external and internal data can dig more insights and reveal novel perspectives thus making a valuable impact on firm performance (Zhao et al., 2014). Subjective to these mentioned facts and following Gupta & George (2016), data is considered as a dimension of big data analytics competency.

Bigness of data points toward the immense growth in availability of data around, which generates the need for data analytics (Lycett, 2013). Enhanced adoption of smart devices is adding tons of volume to data every single day (Newell & Marabelli, 2015). Additionally, this increase in volume is devised by varieties of data such as structured, semi structured and unstructured data (Abbas et al., 2016; Li & Zhai, 2018) with generation velocity near to real time (Ertemel, 2015). A study by Fernández et al. (2014) has endorsed that organizations can

add high value to their performance by identifying hidden patterns revealed as a result of processing and analyzing big data which is near-real time data with high volume and variety. This imperative role of bigness of data makes it a key dimension of big data analytics competency.

Data quality is determined by its fit for the purposive use, its accuracy and reliability, level of details, completeness and number of other characteristics (R. Y. Wang & Strong, 1996). A recent report claimed data quality as a main hurdle in development of big data analytics competency considering that organizations want to analyze more and more of their acquired data irrespective of its quality (Hazen et al., 2014). Though novel analytics tools and technologies are advance enough to spot the useful and valuable information from data (Russom, 2008), quality of data to be used still has an impact on the results of data analytics (Popovič et al., 2014). Organizations therefore, should consider only high quality data to gain valuable insights and make effective decisions to enhance firm performance (Lycett, 2013). Considering the critical role of data quality, Anandhi S. Bharadwaj (2000) stated it as one of the key dimensions of BDAC.

Technology has always played a crucial role in gaining competitive advantage and making an organization superior to its peers (Nicholas G. Carr, 2003). A technical report from Executive Office of the President of United States suggests that key characteristics volume, velocity and variety, which act as a differentiator for big data from traditional data demand such technologies which are advanced enough to handle the gigantism, diversity and fast generation and transfer of big data (E.O.o.P, 2014). Therefore, acquisition of new technologies has become an absolute necessity for firms to store, process, analyze and gain insights from piles of data available to them (Kaisler et al., 2013). Taking these arguments into consideration and moving in line with Gupta & George (2016), technology has been considered as a significant dimension of BDAC.

Basic resources such as finance and time have been identified to play a vital part in creating effective BDAC of an organization. Taking the uniqueness and novelty of big data and the apposite technologies, jobs and duties into consideration, majority of organizations are still on their way yet to make standard strategies and procedures in this domain. There exists therefore, a probability that organizations practicing big data analytics in their system may not achieve immediate desired results. However, what matters is firm pertinacity and determination to achieve their analytical goals thus by devoting sufficient basic resources (Mata et al., 1995; Wixom & Watson, 2001). Based on study by Gupta & George (2016) and significant role of basic resources, it has been examined as a dimension of big data analytics competency.

Technical Analytics Skills entail the level of expertise employees own related to knowledge and usage of sophisticated technologies to treat big data. Generally, technical skills like programming, database expertise, system analysis and design are not rare but considering the novelty of big data technology and its associated skills, organizations having employees with



mastery skills as their asset are probably superior to their competitors (Mata et al., 1995). On contrary, analysts possessing not enough of technical analysis skills might consider procrastinating things causing wastage of time, resources, making blunders yet being unable to deal with problems being faced (Maryam Ghasemaghaei et al., 2015) and consequently generating no good impact on organization performance. This thus, legitimates the vital role of technical analytics skills in building competency and effecting firm performance.

Managerial skills demands well-built bond among workforce of the same or different units or departments (Anandhi S. Bharadwaj, 2000). Taking big data analytics into consideration as an IT driven competency, it is impossible to exploit it to its full advantage if analytics managers are not capable enough to see the rays of future benefits obtained from data-digged insights (Lavalle et al., 2011). Organizations therefore, are needed to have managers with deep knowledge of present and future needs of business units, their partners, their customers and hold an intense understanding of application of newly discovered values driven through data analysis to areas which can generate maximum benefits to a firm (Gupta & George, 2016). Managerial skills, is thus a domain which cannot be overlooked when organizational competencies are analyzed.

Domain knowledge refers to the employees' sound understanding of organizational goals and objectives, internal capabilities and external environment. It is observed that some organizations invest heavily in discovering new business insights from data yet a very little in development of employees' knowledge (Waller & Fawcett, 2013). While, knowledge is a resource which can never be taken away yet with the development of modern technologies, there is always a need of exploring new domains and updating organizational goals and capabilities to sustain in an unpredictable business world (Teece, 2015). Holding enough of a domain knowledge makes analyst capable of recognizing the core strengths and weaknesses, threats and opportunities so to find effective business solutions to concerning problems (Sukumar & Ferrell, 2013). Domain knowledge therefore, is considered as an important dimension in the development of big data analytics competency (Anandhi S. Bharadwaj, 2000; Maryam Ghasemaghaei et al., 2018).

Data-Driven Culture refers to such organizational culture where firms prefer data extracted insights over top management intuition (Andrew McAfee & Brynjolfsson, 2012a). It has been found that despite of bulks of data available, few of the organizations have actually attained the desired benefit through big data analytics investment and the underlying reason identified is that although businesses has started practicing BDA in their units, yet when it comes to decision making these entities are still obliged to experience and instinct of top executives making all the endeavor a firm has made to go in vain (Ross et al., 2013). Given that, it is avowed that data-driven decisions possess the ability to enhance an organization's performance and gain high advantage (Andrew McAfee & Brynjolfsson, 2012a). This justifies the data-driven culture to be considered as an important dimension in analysis of big data analytics competency.

Realizing the increasing importance of big data analytics, number of researchers have attempted to understand when and how BDA can enhance the worth of organization through competitive advantage (Agarwal & Dhar, 2014; Corte et al., 2014). A claim has been made that firms which practices big data analytics in their operations has reported 5% improvement in their productivity and 6% improvement in profitability compared to their competitors (Barton & Court, 2012). Despite of evidences of value creation and improved firm performance through big data analytics, some business executives and chief information officers are reported to show indecisive attitude about making huge investments in BDA owing to unsatisfactory results being observed by themselves or in other firms (Woerner & Wixom, 2015). However, it is argued that disappointing results of big data analytics could be due to the negligence of firms toward vital conditions and requirements for generating insights from data while keeping their concern only with data characteristics like volume etc. (Wu et al., 2016). Additionally, it is found that a prominent number of organizations are yet in initial stage of learning and understanding how to create value through BDA and what are the required resources and capabilities to get maximum of the benefits (Garmaki et al., 2016). Thus, taking the already mentioned facts and growing importance of BDA and its relationship with firm performance into consideration, the current study hypothesis that

“H1: Organization’s competency of big data analytics is positively associated with firm performance.”

Huber (1990) proposed in his theory that whenever an organization adopts new form of technology, this adoption drives the redesigning of decision-making process of that specific body. Additionally, Lu (2011) argued in his study that such organizations which possesses high level of IT capabilities are better at making more accurate and well-timed decisions comparative to those with lower level of IT capabilities. Big Data analytics has been distinguished as one of the IT competencies of firms to treat bulks of data they own and studies have revealed that data analytics specified resources, when integrated and deployed effectively can improve decision-making capability of an organization (Maryam Ghasemaghaei et al., 2018); which is defined by better, faster and more informed decisions (Fernández et al., 2014). Taking the growing influence of big data analytics into consideration, Hagel (2015) and Wamba et al. (2017) stated data analytics as a crucial tool of firm decision-making process. This argument is further supported by researchers including Brown et al. (2011); M. Ghasemaghaei et al. (2017) and A. McAfee & Brynjolfsson (2012), who claimed that increasing popularity of big data analytics owes to its potential of making firm decisions better at quality and fast at speed. Taking these facts into account, the current study hypothesizes that

“H2: Organization’s competency of big data analytics is positively associated with decision-making performance of a firm.”

It is asserted that where successful decisions are driven by using more information and taking more alternatives into consideration on one hand, on other hand the efficient and accurate

decisions produce better firm performance (Bolland & Lopes, 2018). Since big data revolution, organizations in every industry now hold huge piles of external and internal data and their key interest lies in exploiting this data to gain competitive advantage through effectual decision-making and enhance their firm performance (Ertemel, 2015). Past decades witnessed the significant growth in firm performance pertinent to increased innovation and productivity, effective utilization of assets and market value, higher return on asset and equity etc. (Ertemel, 2015) based on improved decision-making performance driven through big data analytics (Brynjolfsson et al., 2011). This view is also supported by Thirathon et al. (2017) in his study which illustrates that it's not only the big data which causes improved firm performance but a firm capability of driving useful insights through big data analysis which enhances the decision-making performance and thus generates better firm performance. The current study thus, proposed a hypothesis considering the fact that higher big data analytics competency improves firm performance provided that improved decision-making performance is here and stated that

“H3: Decision-Making Performance acts as a mediator in positive association between big data analytics competency and firm performance.”

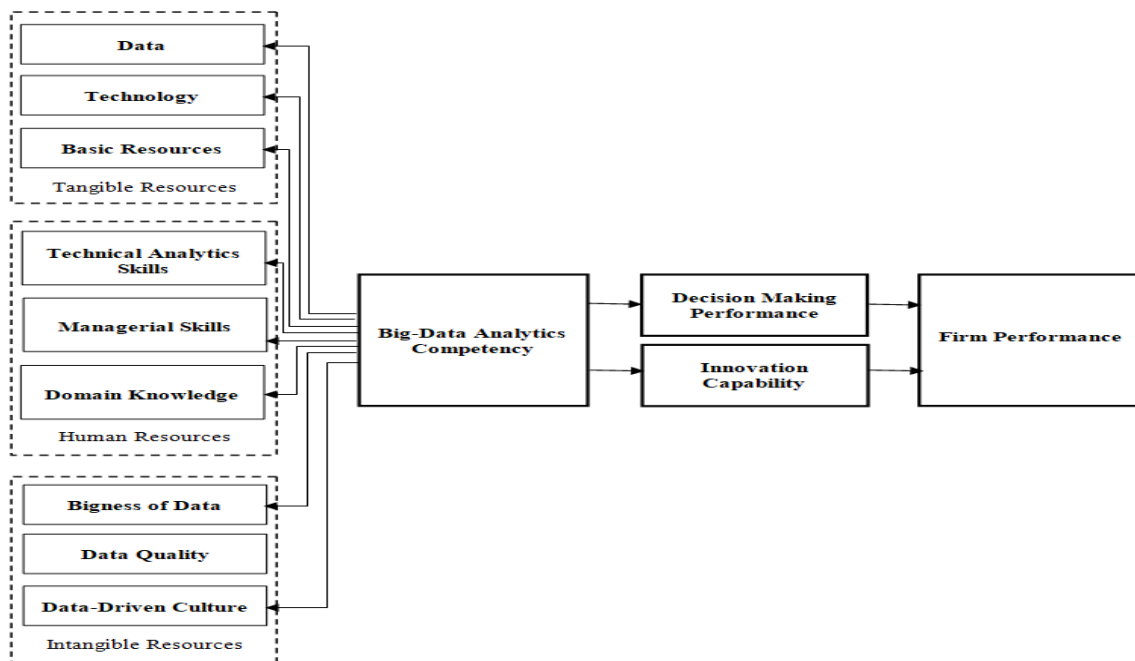
It has been majorly observed that organizations are taking new initiatives and bringing successful innovations based on useful and hidden insights provided through adoption of big data analytics. Beside, BDA have reduced time-to-market for new organizational products and services (Bean, 2018). Given that, a report by OECD has recognized big data analytics as a driver of organizational innovation and growth (OECD, 2015). Innovation, since decades, has been widely acknowledged as a bone of competitiveness and success among businesses (Chatzoglou & Chatzoudes, 2018). Organizations are needed to focus on introducing innovativeness not only in their products but processes, marketing and strategies to escalate firm performance (Tuan et al., 2016). Considering the highly competitive market and need of the hour, businesses are rushing towards adoption of big data analytics which generates high firm performance through innovation practices (Al-Jaafreh & Fayoumi, 2017). However, concept of innovation is vague without firm innovation capability (Laforet, 2011). Studies have identified that it is due to inimitable resources and capabilities of businesses which make them achieve competitive advantage and outperform their peers (Bhatt & Grover, 2005). Referring to firm innovation capability, it makes organizations capable of exploring new opportunities and introducing new products and services accordingly to satisfy customer needs, gain competitive advantage and elevate firm performance (Bowen et al., 2010; Saunila et al., 2014; Yuan et al., 2015). Based on the premise identified earlier that big data analytics drives improved firm performance through innovation and innovation without innovation capability is meaningless, while innovation capability is also a driver of high firm performance, the current study hypothesizes that

“H4: Innovation capability acts as a mediator in positive association between big data analytics competency and firm performance.”

3. RESEARCH MODEL

Based on proposed hypothesis, current study has designed the research model with big data analytics competency as an independent while firm performance as dependent variable with decision-making performance and innovation capability as mediators.

Figure 1: Proposed Research Model



3. METHODOLOGY

The current study tested its proposed research model by conducting a quantitative analysis through a digital survey-questionnaire form.

3.1 Population and Sample

In this study, the relevant population circle has covered the data managers, data specialists, data scientists, data engineers, operation managers, business analysts and executives of such firms which are practicing big data analytics in their units; specifically of telecommunication and banking corporations across the Pakistan while sample size selected was **300** units and the sampling technique used was **Random sampling**.

3.2 Instruments

Instrument adopted to measure big data analytics competency of a firm is derived by the integration of firm resources such as data, technology, basic resources, technical analytics skills, managerial skills, data-driven culture (Gupta & George, 2016), bigness of data, domain knowledge (Maryam Ghasemaghaei et al., 2018) and data quality (R. Y. Wang & Strong, 1996) with reliability value of all the constructs more than 0.7 in previous studies. Decision-making performance of a firm is measured by the instrument developed by Jarupathirun & Zahedi, (2007) with the reliability value more than 0.9. Instrument developed by Balan & Lindsay (2010) was used to measure innovation capability of a firm and the reliability value for all the constructs was greater than 0.7 in previous study. Firm performance is measured using the instrument developed by Ravichandran & Lertwongsatien, (2005) and N. Wang et al., (2012) which is composition of market performance and operational performance and the reliabilities values for the scales were greater than 0.8 in the prior studies.

Although the instrument used in the current study was adopted from previous research studies and its reliability was already tested yet due to factors like culture difference, organization size etc., before proceeding towards larger scale, a proactive approach was considered to conduct a pilot test on 50 survey responses to evaluate the internal consistency of each instrument used to avoid risks related to wastage of resources such as time. A 7-point Likert scale survey was filled by IT and management related employees of firms within the sphere of telecom and banking sector of Pakistan. The findings are recorded in the Table 1 below:

Table 1: Reliability Statistics for Pilot Study

Variable	Source	CA(α)	Items
BDAC	Gupta & George, (2016); Ghasemaghaei et al., (2018); R. Y. Wang & Strong (1996)	0.923	28
DMP	Jarupathirun & Zahedi, 2007	0.772	4
IC	Balan & Lindsay, 2010	0.948	20
FP	Ravichandran & Lertwongsatien, (2005); N. Wang, Liang, Zhong, Xue, & Xiao, (2012)	0.868	7

The computed results clearly show that scale of each instrument has high α within range of 0.7 to 1.0 which is sufficient enough to reach the acceptable reliability ($\alpha > 0.7$) and validates that the items of each variable are worthy to be analyzed so to reach at required results.

4. RESULTS & DISCUSSION

4.1 Sample Characteristics

The sample for current study includes 300 data managers, data specialists, data scientists, data engineers, operation managers, business analysts and executives of such telecom and banking organizations which are practicing big data analytics in their units. 74% of the sample was from telecommunication sector and 26% from banking and finance. As far as age is of concern,

50.7% of sample fall between 26 – 30 yrs, 35% between 31 – 35 yrs, 7.7% between 20 – 25 yrs and 6.7% is above 36yrs. Next, the total experience of employee has also been investigated and it has been found that 54.3% of sample was having experience of 6 – 10 yrs, 32.3% was with experience of 0 – 5 yrs, 12% with 11- 15 yrs and 1.3% with more than 16 and above years of experience. While the experience of employees in the current organization was also asked to assure that they have spent enough of a time in firm to answer the relevant. The evaluated ratio shows that 89% of sample was having experience of 0 – 5 yrs in the current organization, 8.3% was with experience of 6 – 10 yrs and 2.7% with 11- 15 yrs. Furthermore, number of employees in sample organization has also been determined to have an idea about either the body operates at large or small scale and results show that all the employees were part of the big organizations with number of employees more than 150.

4.2 Normality Analysis

Current study used two tests to check the normality of collected data: (1) **Skewness** to check the symmetry of data distribution, and (2) **Kurtosis** to check the height/sharpness of data distribution. The two tests used histograms to visually inspect the skewness and kurtosis of each construct. In addition, box-plot and Q-Q plot are used to identify the outliers. The cutoff value adopted for acceptable skewness and kurtosis coefficient of data was between -1.29 to +1.29.

4.3 Reliability and Correlation Analysis

The current study used 7-point Likert scale for all the items to conduct reliability and correlation analysis of model. The findings computed using SPSS 20 are reported below in the Table 2.

Table 2: Model Analysis

S.no	Variable	CA	1	2	3	4
1	BDAC	.92	1			
2	DMP	.77	.54**	1		
3	IC	.92	.71**	.62**	1	
4	FP	.84	.63**	.53**	.59**	1

Note: ** indicates that correlation values are significant at 0.01 level (2-tailed)

Collective analysis of above Table 2 shows value of $\alpha > 0.7$ for each variable thus illustrated that scale of each variable is valid to be adopted in the contextual setting of Pakistan. Additionally, correlation analysis shows that there is no indication of multicollinearity among variables.

4.4 Regression Analysis

Regression Analysis is considered as an enhanced form of correlation analysis and it depicts the dependency of a variable on one or more predictors (Vito et al., 2015). The findings of the regression analysis are under-mentioned.

Table 3: Model Summary

Model	R	R ²	ΔR ²
1	.636 ^a	.404	.402

Note: Dependent Variable: FP
Predictor: (Constant), BDAC

In aforementioned Table 3, correlation coefficient (R) = 0.636 shows that a significant relation exists between both the variables which support **H1**: *Organization's competency of big-data analytics is positively associated with firm performance*. Moreover, coefficient of determination (R²) = 0.404 which explains that rate of change in dependent variable i.e. firm performance that can be explained by independent variable i.e. big data analytics competency is 40.4% while the adjusted R² (ΔR²) = 0.402 explains that effect of R² will be reduced to 40.2% if it is biases-free.

4.5 Dual Mediation with Process v2 16.3 Macro Tool

Referring to Hayes (2017) models, **Model 6** has been adopted in this present study for mediation analysis in which two mediators innovation capability and decision-making performance effects the direct relation of big data analytics competency and firm performance. Using dual mediation with process v2 16.3 macro tool, results generated are demonstrated through Figure 2 below:

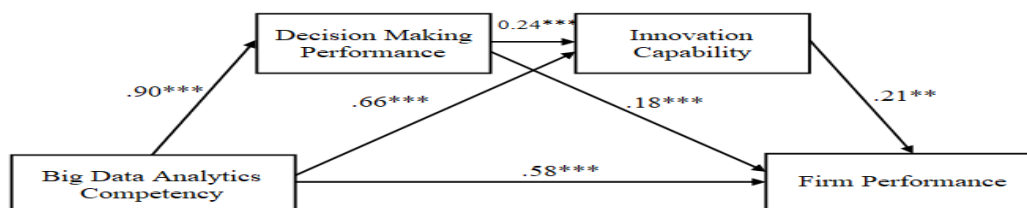


Figure 2: Dual Mediation Model
Note: *p< .05, **p<.01, ***p<.001

Figure 2 demonstrates that BDAC has significant effect on FP ($\beta = .58$, $t(297) = 6.3728$, $p = .0000$) which makes the proposed hypothesis **H1** approved. Besides, BDAC causes a significant effect on DMP ($\beta = .90$, $t(298) = 11.089$, $p = .0000$) and there exist no zero value between LL (.7474) and UL (1.0701) within the bootstrapped 95% confidence interval. This

thus built the basis for acceptance of **H2**: *Organization's competency of big data analytics is positively associated with decision-making performance of a firm*. Furthermore, DMP effects FP significantly ($\beta = .18$, $t(296) = 3.7767$, $p = .0002$) while the significant effect of IC on FP ($\beta = .21$, $t(296) = 2.6778$, $p = .0078$) has also been shown.

Additionally, Table 4 and Table 5 show the results for total and indirect effect of BDAC on FP.

Table 41: Total Effect on FP

	Effect	p	LLCI 95%	ULCI 95%
BDAC	.9362	.0000	.8066	1.0659

Table 4 specifies the Total effect of BDAC on FP ($\beta = .93$, $t(298) = 14.2161$, $p = .0000$) which shows that effect got mediated as it is different from the direct effect of BDAC on FP.

Table 5: Indirect Effect of BDAC on FP

	Effect	BOOTLLCI	BOOTULCI
Total	.3554	.2106	.5223
Ind1	.1658	.0614	.2808
Ind2	.0479	.0109	.0959
Ind3	.1418	.0303	.2770

Note: Ind1: BDAC -> DMP -> FP Ind2: BDAC -> DMP -> IC -> FP Ind3: BDAC -> IC -> FP

The indirect effects through each mediator with bootstrap sample size 5000 has been recorded in Table 5 above indicates that no zero value is lying between LLCI and ULCI in the 95% confidence interval through each mediation path, thus the model has got mediation effect and it leads to the validation of hypothesis **H3**: *Decision-making Performance acts as a mediator in positive association between big data analytics competency and firm performance* and **H4**: *Innovation capability acts as a mediator in positive association between big data analytics competency and firm performance*.

5. CONCLUSION

This study has been carried out with an ultimate goal to explore the effect of big data analytics competency on firm performance in telecom and banking-based organizations of Pakistan. Data for this study was collected from organizations which were practicing big data analytics in their organizational system through a digital survey –questionnaire to measure the degree to which big data analytics competency is posing an impact on improvement of firm performance with mediating role of decision-making performance and innovation capability.

The study is based on view of Resource Based Theory that better integration and deployment of resources generates better organizational results. Firstly, it explored the integration and

deployment of big data analytics specified resources which are driver of BDAC and then its influence on firm performance in telecom and banking organizations of Pakistan. Statistical tests are carried out to analyze the reliability and validity of proposed model. Additionally, different tests like correlation analysis, regression analysis and mediation analysis are performed to determine the acceptance or rejection of proposed relations. Present study has hypothesized that BDAC and firm performance are in positive association with each other and results have validated this which interprets that organizations having high level of big data analytics competency have high level of firm performance too. Next, this study has proposed that a positive association exists between BDAC and firm decision-making performance and results have provided evidence for this showing that if organizations capability of big data analytics is high, their decision-making performance is high too. Moreover, study has also provided ground for its another hypothesis which anticipated that innovation capability is in positive association with firm performance as results have provided the validation of this relation. Furthermore, hypotheses under this study predicted that decision-making performance and innovation capability mediates the relationship between BDAC and firm performance and results have indicated that presence of decision-making performance as well as innovation capability mediated the said association. This study, thus, tried to provide the holistic view of impact of big data analytics competency on firm performance with exploration of mediating behavior of decision-making performance and innovation capability in telecom and banking sector of Pakistan.

5.1 Theoretical and Practical Contribution

The significant contribution made by current research has wide applicability in purview of big data analytics management and firm performance. The role offered by current study is of immense importance as previous literature laid their emphasis majorly upon influence of BDAC on firm performance with a limited number of dimensions in it (Gupta & George, 2016) but this study facilitate the literature by analyzing the mediating effect of innovation capability and decision-making performance in relation between BDAC and firm performance while making an effort to cover a significant number of possible resource dimensions. Additionally, it is observed through previous studies that there is lack of literature available in domain of big data analytics regarding Pakistan organizational setting; present study thus, has made its part in bridging this gap in literature.

Findings of this study have highlighted the direct and indirect relationship between big data analytics competency and firm performance and revealed that relation between BDAC and firm performance do gets influenced by performance of firm decision-making and innovation capability and that merely BDAC is not enough to generate high firm performance, which is equally important to researchers as well as practitioners because it'll draw their attention towards aspects which are of significance importance to achieve the ultimate goal of organizations through investment in big data analytics which is enhanced firm performance.



5.2 Limitations and Future Research

Like any other research, this study possesses some specific limitations too. Firstly this study is limited only to Pakistan telecommunication and banking industry. Results may produce different outcomes for other sectors in Pakistan or for the same sector in other countries around the globe due to characteristics like size or culture of organization, etc which can drive the future research. Secondly the sample size chosen was limited to 300 individuals only and the study was limited to analysis of cross-sectional data.

Next, present study has incorporated only few of the possible dimensions to explore big data analytics competency of an organization; while there exist probability that other dimensions can generate a strong impact too. Furthermore, the current study has explored the effect of BDAC on overall firm performance and not on a certain area; future researchers thus can explore the effect of BDAC with in specific department or area such as supply chain management etc. Also, this study has facilitated only two mediators in relation between big data analytics competency and firm performance. While there might be other factors which can mediate the mentioned relation however it was not possible to entertain all. Lastly, the current study has not explored the effect of any moderator in this study. This research study can be taken further with additional analysis of top management support, employees' commitment or readiness for change in this relation as moderator variables.



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