Mediating Effect of Data-Driven Culture on the Relationship between Big Data Analytics and Firm Performance

Muhammad Khalid Saeed[*], Hassan Mujtaba N. Saleem[†], Jawad Iqbal[‡]

Abstract

The study explores the effect of the Big Data Analytics Capability (BDAC) on the performance of the firms in the restaurant industry of Southern Punjab, Pakistan and explores the mediating factor of Data-Driven Culture (DDC). The empirical basis of the analysis was collected by use of structured survey where 390 responses were collected out of 550 distributed questionnaires. The analysis of data was performed with the PLS-SEM of SmartPLS 3.0 on the basis of reliable and validity procedures. Findings indicate that BDAC does not affect performance of firms in this case in a significant manner but the indirect effect of BDAC on performance through DDC has been found to have a significant and positive correlation implying full mediation. These results imply that, despite the fact that investments related to technology only do not convert into performance improvements, provided that organizations do not develop a culture that embraces the use of data in the process of making decisions. The research also builds towards the Resource-Based View in that BDAC only creates value when it is supported by the intangible cultural resources. In practice, the results indicate that SMEs operating in underdeveloped countries should first build internal data cultures before anticipating any viable returns of analytics technologies.

Keywords: Big Data Analytics Capability; Data-Driven Culture; Firm Performance; Restaurant Sector; PLS-SEM

Introduction

The idea of Big Data Analytics Capability (BDAC) has become one of the most important organizational assets as companies all over the globe tend to rely more on data-intensive considerations in order to enhance their decision-making processes, efficiency of their operations, and competitiveness. The fast increase in the amount, diversity, and speed of data has necessitated organizations to use analytics-driven tools and techniques aiding in forecasting, optimization, and strategy reactions to market dynamics (Fattah, 2024). Manufacturing, finance, healthcare, retail, and insurance are the examples of industries experiencing the opportunities of BDAC to produce insight and prompt performance outcomes (Khalil et al., 2023;

[*] PhD scholar, The Islamia University of Bahawalpur, Pakistan. Email: jmkhalidsaeed@gmail.com

[†] PhD, Associate Professor, The Islamia University of Bahawalpur, Punjab, Pakistan. Email: hassan.saleem@iub.edu.pk

[‡] Professor, Dean, Management Sciences and Commerce, The Islamia University of Bahawalpur, Punjab, Pakistan. Email: jawad.iqbal@iub.edu.pk

Morimura and Sakagawa, 2023; Qaffas et al., 2023). Regardless of these global developments, efficient execution of BDAC is not balanced among regions and sectors. Organizational challenges that result in inability to realize the analytics investments in the performance gains may be internal limitations (lack of data literacy, poor technological foundation, unwillingness to decide via analytics, lack of supportive organizational culture). The challenge is especially observed with small and medium enterprises (SMEs) functioning in developing economies because informality in management, resource constraints, and unstructured data practices in such enterprises lead to the inability to implement analytics successfully (Ciampi et al., 2021; Olabode et al., 2022).

These are acute in the restaurant industry of Southern Punjab, Pakistan, where there is a high business failure, inefficiencies, unstable service delivery, biases in cultural decisions, and a high rate of competition. The data about most restaurants in this area are not gathered in an organized manner, analytics are rarely used in forecasting or planning and the technological support of most of these restaurants is low. Despite the global ability of BDAC to be a competitive differentiator, its potential is not really utilized within the scope of this regional and sectoral environment. It is necessary to understand how the constraints of BDAC work to realize the value of BDAC applied within the confines of the organization to understand the organizational dynamics necessary. The current evidence indicates that BDAC by itself is ineffective in promoting the performance of firms, unless accompanied by intangible organizational resources e.g. a Data-Driven Culture, where evidence-driven decisions are made as opposed to intuition-driven (Bharadiya, 2023; Karaboga et al., 2023). An effective DDC promotes data access, analytical thinking, minimizes cognitive bias, and builds a mutual conviction on the importance of making decisions on the basis of data. In the absence of such a culture, it is possible that analytics tools will not be fully utilized or be in mismatch with operational requirements.

In this line of contexts, there are knowledge gaps of significance. Although extensive literature has been focused on the extensive research on BDAC in technological advanced industries and developed economies, there is no significant empirical information on service-based SMEs in the underdeveloped economies, like Southern Punjab. Also, despite the hypothetical support of the organizational culture as moderating the correlation between BDAC and performance, there are no empirical works which affirm this. Introduction of this mechanism have been found in low-technology and resource-limited settings are on the short supply.

To address these gaps, this study investigates:
1. Whether BDAC has a direct impact on the firm performance in the restaurant industry in Southern Punjab, and
2. Whether DDC mediates the association between BDAC and the performance of the firm.

This study is based on the Resource-Based View (RBV) to propose that BDAC is a valuable asset, but its application creates benefits in performance only when it is supplemented with other capabilities like cultural preparedness and decision norms that rely on analytics. The study contributes to the scientific community by refining the RBV through the combination of technological and cultural assets and the introduction of the cultural aspects of the issue, and it also contributes to the business sector as it allows pointing out aspects that SMEs in developing economies should pay attention to receive the benefit of analytics.

Theoretical foundation and literature review
Resource Based View Theory

The theoretical framework used in the given study offers the Resource-Based View (RBV) that explains the ability of the firms to gain performance advantages due to valuable, rare, inimitable, and non-substitutable resources. RBV claims that there are variations in the values of the resources endowed by the organizations and that the variations allow variation in performance even within the same industry (Mishra et al., 2019). RBV has two fundamental assumptions: resource heterogeneity (the claim that firms have varying bundles of resources) and resource immobility (the claim that these resources cannot be moved and imitated by other firms) (Singh et al., 2022). BDAC is a strategic enterprise in the sense of analytics in the definition of technological infrastructure, human expertise, and managerial capabilities that facilitate the acquisition, processing, and application of the data to make informed decisions (Kamboj and Rana, 2023). Once well combined, they will have a positive impact on the business process, less uncertainty, and long-term competitive advantage (Shan et al., 2019). According to RBV followers, the performance is enhanced upon the existence of the tangible and intangible resources that are complementary to each other, including data quality, analytics platforms, and cultural readiness, which complement data-driven analytics-based decision-making (Dubey et al., 2019). Therefore, BDAC is a resource-based capability which forms a result of resource interplay and not of technology. This theoretical approach explains the difference between the successful application of analytics in some companies and negative results in others: the value is determined by the efficiency of BDAC implementation in organizational routines and culture. Based on this, the research uses RBV to analyze the

functioning of BDAC and Data-Driven Culture in collaborating to determine their impact on the performance of firms.

Big Data Analytics Capability and Firm Performance

Research has also found that BDAC has a significant impact to firm performance, which has been reported in enhancing the quality of decisions, operational efficiency as well as strategic responsiveness to the firm. Latest research indicates that a positive correlation is present between BDAC and such performance factors as agility, innovation, customer satisfaction, and financial outcomes (Bahrami and Shokouhyar, 2022; Jha et al., 2020; Mandal, 2019). According to the RBV, BDAC helps firms to increase resource coordination by providing the ability to turn information into practical insights, which improves strong competitive placement (Mikalef et al., 2020). The literature has different conceptualizations of BDAC. Some researchers use the terms of big data like a lot, diversity, and speed, whereas others can appeal to socio-technical aspects such as infrastructure, human skills, and the capacity of managerial organizations (Karaboga et al., 2023; O'Neill and Brabazon, 2019). Socio-material approaches state that the value of analytics will be achieved in the conditions when the technological and human resources are complementary but not autonomous (Karaboga et al., 2019).

The empirical research also indicates that BDAC enhances organizational performance in the event of the right mechanisms in the organization. To support the argument, an example is the use of analytics-enabled insights to enhance supply chain resilience and better operations management and resource planning, reducing uncertainty and uncertainty and making a quick change in response to market changes (Awan et al., 2021; Kristoffersen et al., 2021). Additionally, companies that have greater BDAC usually realize lower costs, greater productivity, and better strategic alignment (Chaudhuri et al., 2021; Gupta et al., 2020). Nevertheless, previous studies also show that the effect of BDAC is not necessarily direct. BDAC can produce few performance improvements in resource-constrained or culturally traditional settings, without organizational preparedness, management commitment, and an organizational culture encouraging data-use (Ciampi et al., 2021; Olabode et al., 2022). These relative results indicate the value of studying more processes, like culture, which can shape the impact of BDAC on the performance of the firm.
H1: Big Data Analytics Capability has a significant direct effect on firm performance.

Mediating Role of Data-Driven Culture (DDC)

Organizational culture is a set of common values, norms, and expectations of behavior that influence the internal process and decision-making (Chaudhuri et al., 2021). A Data-Driven Culture

(DDC) is the particular process of evaluating the degree to which organizations rely on analysis to make decisions as opposed to intuition or custom. It is believed that building such a culture is the best way to ensure that BDAC will be as valuable as possible and minimize the subjective evaluation (Awan et al., 2021; Karaboga et al., 2019). The existing literature stresses that DDC is a critical intangible ability that helps companies transform analytics potential into valuable actions (Chatterjee et al., 2024; Karaboga et al., 2022). Companies and organizations that have high DDCs consider analytics as a strategic resource, give employees access to data, make investments in data literacy, and promote the adoption of analytical approaches at each level. Such cultural support will increase BDAC adoption and integration to daily operations to increase the quality of decisions and performance results.

Studies also indicate that technological resources can be inadequate (i.e. analytics platform or data warehouse) without employees believing, comprehending, and utilizing data in their operations (Storm and Borgman, 2020). Human and cultural factors hence define what will happen to BDAC, whether it becomes a routine or not used properly. As a result, with the assistance of DDC, organizations can read the market signals more efficiently, react in a timely manner to the environmental shocks, and be more innovative (Wamba et al., 2017). This research suggests that DDC can be the mediating factor between BDAC and the performance of the firm. Improved value of BDAC is increased when the firms are constructing robust cultural norms in relation to data usage and performance gains are more observable.

H2: Big Data Analytics Capability has a significant positive effect on Data-Driven Culture.

H3: Data-Driven Culture has a significant positive effect on firm performance.

H4: Data-Driven Culture significantly mediates the relationship between Big Data Analytics Capability and firm performance.

See below figure 2.1.
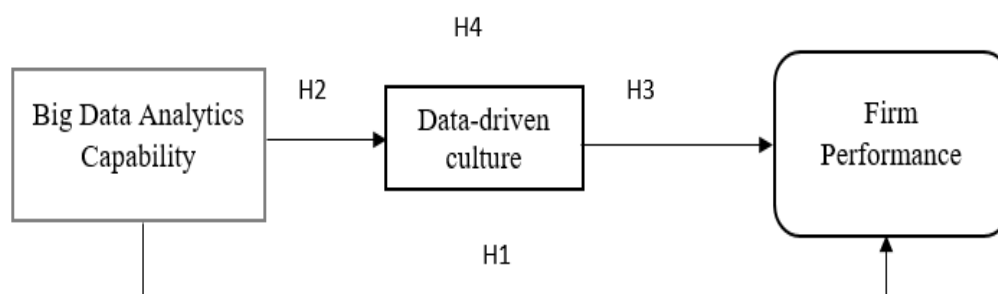
Conceptual Framework

The model demonstrates that the Big Data Analytics Capability positively enhances Firm Performance through the establishment of high-quality Data-Driven Culture that serves as the channel connecting analytics to the improvement of performance.

Literature Gap

Despite the overall evidence that the Big Data Analytics Capability ability accelerates innovation, agility, and operational performance of technologically advanced industries (Bahrami and Shokouhyar, 2022; Gupta et al., 2020; Jha et al., 2020), little empirical support is in the low-technological, resource-constrained service industries. The majority of research done on BDAC concentrated on manufacturing, finance, logistics or international digital-based firms in which the technological readiness and formal data infrastructures are already in place (Mikalef et al., 2019; Karaboga et al., 2023). Service based SMEs, especially in developed areas, on the other hand have an informal decision routine, a lack of data literacy, and a scant use of analytics (Ciampi et al., 2021; Olabode et al., 2022). This missing point is very crucial as RBV points out that the value of a capability does not just exist on whether it is possessed or not but on whether it can be activated during routines in the organization. As such, the paucity of knowledge of the operations of BDAC in operationally weak and culturally traditional industries, e.g., restaurants in Southern Punjab, is a significant empirical gap.

Need for Mediation Mechanisms

Moreover, previous papers underscore the fact that even the technological capabilities (i.e., BDAC) do not directly converge into a better performance in most cultures unless they are supported by some supplementary intangible resources (i.e., organizational culture, managerial attention, and strategic alignment) (Chaudhuri et al., 2021; Karaboga et al., 2022; Wamba et al., 2017). The continuous research indicates that analytics tools can become value-creating only in the conditions when the employees believe in data, interpret insights correctly, and use them in their daily decisions-preconditions of a Data-Driven Culture (Awan et al., 2021; Chatterjee et al., 2024). Nevertheless, there is a lack of empirical research evaluating DDC as an intermediate process, particularly in the less developed economies where cultural factors tend to prevail over the analytical decision-making (Storm and Borgman, 2020). This supports the necessity of testing how cultural readiness serves as the mediator of how BDAC can affect firm performance especially in service-based SMEs that are in a digital immature environment.

Sector-Specific Need for Analytics Research

      Nevertheless, the global growth in the adoptions of analytics has led to almost no research evaluating the functionality of BDAC in fragmented and informally coordinated areas of service engagements where data, expertise, and infrastructure is constrained (Awan et al., 2021; Khalil et al., 2023). The restaurant market in emerging economies is one of the least researched, despite the fact that the industry is prone to fluctuating customer inflow, inconsistent supply, and inefficient performance that would improve to a better level with insights generated by analytic algorithms (Karaboga et al., 2023; Mandal, 2019). The available literature will center on setting up highly digitized industries, such as retail, finance, and supply chain networks where structured data systems and analytics departments are already established (Kristoffersen et al., 2021; O'Neill and Brabazon, 2019). As a result, very little is known about the functioning of BDAC in service micro-firms and SMEs that base decisions on intuition and use non-formal operating procedures, particularly in areas that are conservative like the Southern Punjab. This lack of industry-specific evidence produces a powerful basis to the investigation conducted in the restaurant sector through empirical research.

Theoretical Gap—Integrating RBV with Cultural Capabilities

      There is also a theoretical void in the literature of combining technological capabilities and cultural and behavioral processes in the framework of RBV. Although RBV makes BDAC one of the desired and scarce capabilities, it also states that performance advantages are only achieved when other organizational resources are present, in particular, the ones that entrench capabilities into daily practices (Shan et al., 2019; Dubey et al., 2019; Singh and Del Giudice, 2019). Nevertheless, the majority of BDAC research focuses on technology, infrastructure, or human skills without sufficiently examining the socio-cognitive conditions disaffiliated to the operation of analytics, namely the cultural norms according to which one prefers to take information, rather than intuition (Chaudhuri et al., 2021; Karaboga et al., 2022). Such insufficiency in integration implies that the current models tend to ignore cultural preparedness as a way of unleashing or diminishing the strategic value of BDAC. Thus, the construction of Data-Driven Culture as a mediating process contributes to the development of the RBV as it illustrates how intangible cultural resources are used to transform technological potential into operational and strategic results.

Research Design, Materials and Methods
Research Design

      The research design is the quantitative and explanatory research design to test the positive and negative association of the Big

Data Analytics Capability (BDAC), the Data-Driven Culture (DDC) and Firm Performance (FP) in the restaurant sector of southern Punjab, Pakistan. The explanatory design is disposed of the fact that the goals of the study are to test hypotheses, which are based on the theoretical premises, and test causation as based on the Resource-Based View (RBV). In line with the comments made by reviewers, such a design offers systematization and objective methodology that can be used to examine the effects of mediation using statistical modeling. The type of survey strategy used was a cross-sectional survey strategy since information was gathered at one instance at a time. The method is consistent with previous works using BDAC and culture-based studies and is adequate to test relationships among the latent variables in an organizational setting. PLS-SEM is the method employed in the study and as per its types it is suitable when prediction-oriented models are needed, complex mediation testing and also where the research has reflective measures. Also, the PLS-SEM is advisable in situations where the research purpose is development of the theory, as opposed to theory announcement.

Population and Sampling

The sample of this research is managers, supervisors and employees employed in restaurants in the Southern Punjab such as Multan, Bahawalpur, Dera Ghazi Khan, Rahim Yar Khan, Lodhran, Khanewal and Muzaffargarh. Among these are the inconsistency in operations, lack of data systems, and informal decision-making, which make such restaurants the right candidates to examine the BDAC and DDC. No probability purposive sampling was involved. Pursuant to the critique of the reviewers, it is reasonable to employ purposive sampling since the evaluation of BDAC and DDC can be conducted only by employees who are involved in the process of making operational, administrative or management decisions. Five-hundred and fifty questionnaires were given, and 390 valid portrayals were receiving, which makes a 71 percent response rate. This is larger than the minimum sampling needed in PLS-SEM that is at least ten respondents certain per indicator or 200 cases in intricate models of mediation

Instrumentation and Measurement

The major data collection tool entailed the use of a structured questionnaire. Multi-item scales that were reflective were to be based on proven and commonly used sources, which guaranteed methodological rigor and addressed the concerns about methodical reliability that reviewers have.

Constructs and Their Measurement Sources

Construct	No. of Items	Scale Source
Big Data Analytics Capability (BDAC)	5 items	Karaboga et al. (2023)
Data-Driven Culture (DDC)	5 items	Karaboga et al. (2023)
Firm Performance (FP)	5 items	Karaboga et al. (2023)

Each of the items has been rated on a five-point Likert scale with 1 being Strongly Disagree and 5 being Strongly Agree. This is the method used in the measurement as the respondents can capture their attitudes, actions as well as practices in the organization in a sensitive manner. The 20 respondents were used in pretesting the questionnaire to make sure that it was understandable and relevant to the context. There were minor changes by correcting wording to achieve better understanding without changing the construct meaning.

Data Collection Procedure

The data were also gathered by administering questionnaires to the employees and managers of the restaurants in person. The respondents were notified of the reason why the study was conducted, guaranteed their confidentiality, and told that participation would be on a voluntary basis. Anonymity was observed to reduce the social-desirability bias and to ensure that the methods used during the process were transparent to the reviewers. Among the 550 questionnaires that were given out, 390 were filled to the detail. There were no response cases that had more than 65 percent and so the full set of 390 responses was put into a pool of analysis.

Data Analysis Technique

The two-step PLS-SEM analysis method was applied to analyzing the data (Hair et al., 2024). The measurement model assessed a great deal of reliability and validity with all loadings, α, CR, AVE, and FornellLarcker criteria all falling to the necessary levels. Path coefficients were then used in testing the structural model which had been bootstrapped t/p-values, R^2, and indirect effects. The findings indicated that BDAC did not affect FP or, the reverse, but had a significant positive impact on DDC, which in turn positively influenced FP, which meets complete mediation BDAC → DDC → FP.

Ethical Considerations

The participation was at the full discretion of the respondent, where all the interviewees were assured of anonymity and

confidentiality. No identifiers of participants were gathered, and the restaurant owners and managers were asked to give formal consent. The information was collected in strict academic ways and there was no violation of ethical standards of research.

Summary of the Section

This section included the research design, sampling procedures, instrumentation and techniques of analysis in the research study. The quantitative explanatory design and PLS-SEM method were chosen to test the connections between BDAC, DDC, and FP. The second section shows the findings of the measurement and structural model tests.

Evaluation, Results and Discussions

This section gives the empirical findings by the use of the Partial Least Squares Structural Equation Modelling (PLS-SEM). After descriptive statistics, the results of measurement model and structural model and hypothesis testing are also presented and discussed in accordance with the expectations of reviewers regarding clarity and the rigor of methods used.

Assessment of the Measurement Model

The operationalization of the measurement model was tested with the help of CFA with SmartPLS 3, which is aligned with Hair et al. (2024). Convergent validity made was ensured because all outer loadings were greater than 0.70, with all constructs gaining acceptable reliability (α and CR > 0.70). The values of AVE were greater than 0.50 threshold showing a sufficient amount of joint variance between indicators. These findings indicate good internal consistency and convergent validity in BDAC, DDC and FP. See below table 4.1-4.5.

Table 4.1.
Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency (n=390)	Percentage (%)
Gender	Male	286	73.3
	Female	104	26.7
Age	18–25 years	167	42.8
	26–30 years	124	31.8
	31–35 years	63	16.2
	Above 35 years	36	9.2
Marital Status	Single	213	54.6
	Married	177	45.4
Education Level	Intermediate	102	26.1
	Bachelor's	184	47.2

	Master's	87	22.3
	Other/Professional	17	4.4
Job Position	Frontline Staff	221	56.7
	Supervisors	97	24.9
	Managers	55	14.1
	Other Roles	17	4.3
Work Experience	Less than 1 year	88	22.5
	1–3 years	154	39.5
	3–5 years	96	24.6
	Above 5 years	52	13.4

The table indicates the participants who were involved in the study, a summary of their gender, age, education, job position, and work experience hence can explain the background of the ample 390 restaurant employees who were surveyed.

Table 4.2
Measurement model results

Construct	Items	O.L	α	*CR*	AVE
Big Data Analytics Capability	BDAC1	0.822	0.826	0.878	0.591
	BDAC2	0.732			
	BDAC3	0.748			
	BDAC4	0.814			
	BDAC5	0.725			
Data Driven Culture	DDC1	0.860	0.899	0.926	0.714
	DDC2	0.847			
	DDC3	0.860			
	DDC4	0.879			
	DDC5	0.773			
Firm Performance	FP1	0.869	0.915	0.937	0.747
	FP2	0.808			
	FP3	0.887			
	FP4	0.880			
	FP5	0.875			

The paper deploys the PLS-SEM using SmartPLS 3.0 through the RBV-informed analysis of the survey data of 390 employees working in restaurants in Southern Punjab by exploring how BDAC can be amplified to performance using a Data-Driven Culture. The structure of data, validated measuring scales and cross-sectional design confirm that mediation testing can be conducted using acceptable theoretical and empirical analytics.

Discriminant Validity

    The Fornell-Larcker criterion was used to ascertain discriminant validity. The square root of (AVE of each construct) compared with all other constructs gave higher correlations, which

abides by the requirement that BDAC, DDC and FP are different latent variables.

Table 4. 3
Discriminant validity result

	1	2	3
BDAC	*0.769*		
DDC	0.652	*0.845*	
FP	0.481	0.539	*0.864*

The greater the numbers in the diagonal, the more the variable is the strongest with itself and the lesser the numbers, the greater the BDAC, DDC and Firm performance are related yet remain distinctly different to each other.

R-Square Values
The results of R-square indicate that the model BDAC accounts 42.5% of the heterogeneity in DDC and adding DDC to the former does not improve this result as the model only accounts 32% of the heterogeneity in FP. These values show intermediate explanatory power, which fits the behavior research and the organizational research.

Table 4.4
R-Square Values

	R Square	R Square Adjusted
Data Driven Culture	0.425	0.424
Firm Performance	0.320	0.316

This model accounts for around 42 percent of the formation of Data-Driven Culture and around 32 percent of the enhancement of Firm Performance, that is, the predictors present a fair and significant degree of response. See below figure 4.1-4.2.
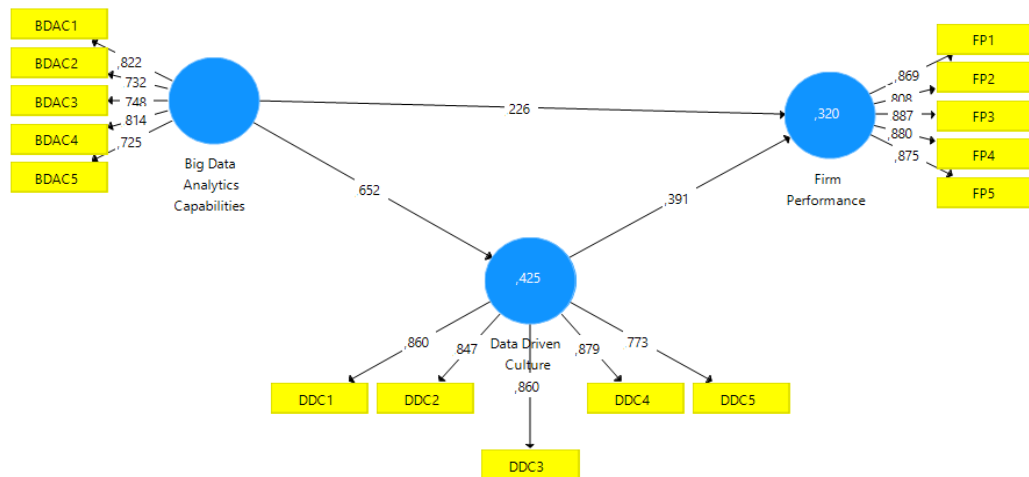
Assessment of the Structural Model

Figure 4.1: Measurement Model

As indicated in the diagram, Big Data Analytics Capability is a very strong predictor of Data-Driven Culture, and both of them are the determinants of a significant proportion of Firm Performance, the latter being mediated by the former. The structural model was evaluated using the path coefficients, bootstrapped t-values (5, 000 subsamples), p-values and indirect effects. The variance inflation factor (VIF) values were lower than the value and this fact demonstrated that multicollinearity did not exist. The results support the mediation hypotheses and are also in line with the specification of the model defined by the reviewers.

Table 4.5.
Results of hypothesis testing of direct effects

Paths	Beta Value	T-Value	P-Value
Big Data Analytics Capabilities -> Firm Performance	0.226	3.629	0.000

Big Data Analytics Capabilities -> Data Driven Culture	0.652		24.738	0.000
Data Driven Culture -> Firm Performance	0.391		8.506	0.000
Big Data Analytics Capabilities -> Data Driven Culture -> Firm Performance	0.255	7.664	0.000	

The statistical significance of all the paths is the presence of a great positive effect of BDAC on Data-Driven Culture, a meaningful effect of culture on performance, and the influence of this cultural pathway of BDAC on performance is direct instead of direct.

Structural model
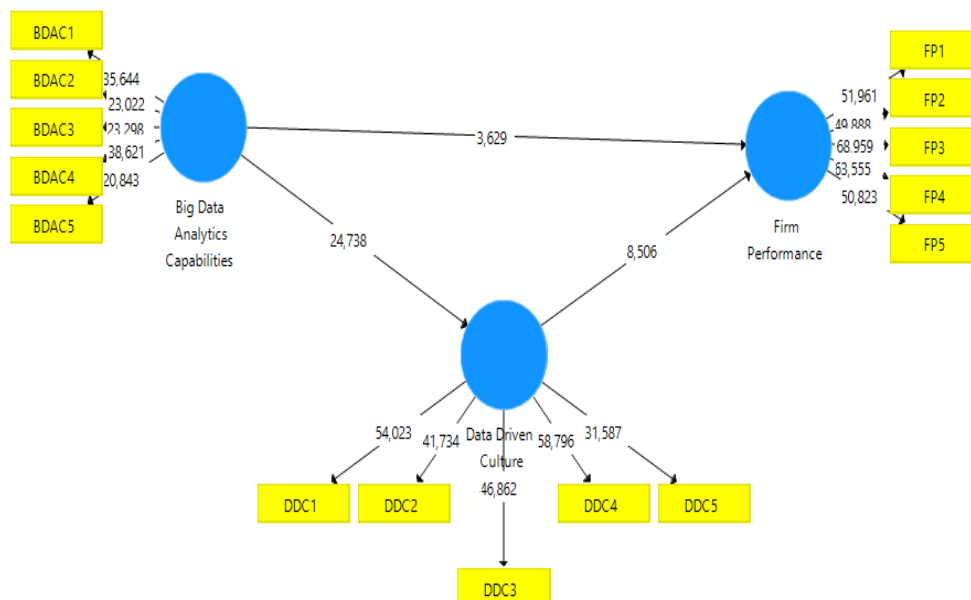
Figure 4.2. Structural Model
BDAC has a strong positive relationship with Data-Driven Culture, and from this trend, both concepts have a strong relationship with Firm

Performance, and the t -values are very high to demonstrate the statistically correctness of the relationships.

Big Data Analytics Capability → Firm Performance (RQ1)

The direct impact of BDAC on the firm performance was not justified. Despite the significance of BDAC as a technology source, in Southern Punjab, restaurants are not complemented by the additional structures, including trained analytics personnel, formal data procedures and technology-based data decision routines, which are essential in transforming analytics capability into quantifiable results. The observation is consistent with the previous studies (Gupta and George, 2016; Mikalef et al., 2019; Wamba et al., 2017), where it is stated that BDAC can hardly lead to performance improvements unless relevant cultural and managerial factors are met. As it was also claimed in RBV and in Dynamic Capabilities Theory, BDAC in itself does not generate value; the actual performance effect is revealed only when the capability is implemented in effective organizational processes.

Mediating Role of Data-Driven Culture (RQ2)

The mediation analysis indicates that BDAC is of great importance in improving DDC and vice versa. The indirect effect (BDAC → DDC → FP) is powerful and meaningful, which proves complete mediation. It implies that BDAC is one of the primary factors that contribute to better performance because it allows adopting a culture where decision making is informed by facts, as opposed to intuition. Managers and employees within such a setting have analytics as part of their day-to-day operations of analyzing customer feedback and menu planning, service improvements to achieve responsiveness and efficiency. This is also consistent with Bharadiya (2023) as well as it builds on RBV showing that intangible cultural resources enhance the worth of technological capabilities. The findings point to the fact that BDAC cannot be beneficial to the firms unless behavioral data, learning processes and evidence-based decision-making are internalized at the organizational levels.

In addition to the direct and mediated impacts identified, a more numerous structural system within low-digital service settings like Southern Punjab can also be identified based on the findings; that BDAC is frequently superficial, with little penetration of the strategic routines within the organization. In spite of the fact that most restaurants technically have transactions data, customers records, or online delivery history, it is not linked with operating decision. This supports the argument that in less developed economies, companies can have a symbolic analytics capability, which is the semblance of BDAC even in the absence of the systems, routines and expertise to transform analytics into productivity gains. Mikalef et al. (2019) and

Wamba et al. (2017) highlight the fact that analytics infrastructure alone will not generate competitive advantage because it would need to be complemented by absorptive capacity and organizational readiness to act according to the data-driven insights.

The mediation effect found in the current research also provides support to the argument that DDC is not merely an attitudinal element, rather a behavioral intervention process that re-fits the manner in which the workers perceive and address the issues that occur in the operation. Individual restaurants with higher measures of data-driven norms had higher consistency in the growth of the forecast, resource planning and service efficiency-the results that are consistent with the forecasts of Chaudhuri et al. (2021) and Karaboga et al. (2022). This trend indicates that DDC is a cognitive alignment intervention aimed at decreasing the resistance towards analytics adoption, decreasing the level of intuition reliance, and nurturing the evidence-based decision habit. Without such cultural structures, BDAC is isolated in pieces, arbitrarily used or not appropriately relevant to real challenges of performance.

Managerial implications of the results are also crucial to the SMEs working in unstable and limited resources market environments. In Southern Punjab restaurants, demand varies on a daily basis, supply chain is not consistent and staffing is a problem that can be better solved through analysis. However, the research shows that such companies do not realize performance increase until the creation of uniformity of internal norms of data usage. This confirms earlier studies that indicated learning and behavior adequate competitiveness in SMEs to be dependent on analytics, as opposed to technology-dependent (Ciampi et al., 2021; Olabode et al., 2022). Thus, to achieve operational stability and involvement into the living environment, the investment priorities of SMEs should change so that they will be focused on developing culture, training employees, and creating data governance rather than buying hardware and software.

Lastly, the research outcomes contribute to theoretical knowledge by revealing the intersection of RBV and the socio-technical perspectives in terms of analytics adoption. The socio-technical theory, by assuming that joint optimization of technological resources and human processes is beneficial, is more focused on joint flexibility between resources and complementary capabilities of a business than RBV, which supports its claim that competitive advantage develops out of resource interaction events. This intersection is entirely empirically confirmed by the entire case of mediation that is found in this study: BDAC (a technological resource) gains strategic relevance solely when it is buttressed by DDC (an intangible cultural capability). This proves that value of BDAC is not a result of just possession, but there are socially embedded practices which influence interpretation, communication, and operationalization

of data. Therefore, the research adds a sector-specific, developing economy lens to the wider BDAC literature by highlighting the fact that cultural mechanisms represent the final constituent in converting the potential of analytics into quantifiable performance results.

Conclusion

This paper analyzed the role of Big Data Analytics Capability (BDAC) in improving Firm Performance (FP) of restaurant business living in Southern Punjab, Pakistan and tested the mediating efficiency of a Data-Driven Culture (DDC). The results verify that no significant performance improvements in this resource-gap and culturally traditional environment are brought about by BDAC itself. Rather, BDAC enhances performance in an indirect and comprehensive way by creating a positive data-driven culture, which requires complete mediation. This proves that analytics technology cannot be satisfactory unless it is supplemented by other soft capabilities in the form of data literacy, analytical norms and evidence-based decision routines. Basing the findings on the Resource-Based View (RBV), the findings support the idea that the value creation is a result of the interaction between tangible and intangible resources and not the investment in technology on its own. The research builds upon the previous research by providing evidence on the under-researched service-sector environment in a developing area that confirms cultural readiness is the key process by which BDAC can be made strategically useful. In general, the study emphasizes the fact that it is only in the case of the organization incorporating cultural and behavioral underpinnings that will be used to justify the implementation of data into the day-to-day operations that analytics investments may yield performance-related gains.

Recommendations

Based on the empirical findings, the following recommendations are proposed for managers, practitioners, and policymakers:

1. **Prioritize Building a Data-Driven Culture Before Technology Investments**
   The initial suggestion that the restaurants need to make is to strengthen the internal norms that will generate the use of data, minimize biases in making decisions, and properly encourage analytical thinking among all levels of management.

2. **Develop Data Literacy and Employee Training Programs**
   BDAC needs to be internalized to operational procedures by training employees to understand customer data, dashboard reports, and operational analytics.

3. **Formalize Data Collection and Decision Protocols**
   To have good inputs at BDAC, restaurants should create

centralized data platforms, such as customer feedback catalogs, POS analytics, inventory management, etc.

4. **Strengthen Managerial Commitment to Evidence-Based Decisions**
   Institutional culture change should be facilitated by making visible and rewarding data-based decisions by owners and supervisors.

5. **Gradually Integrate Affordable Analytics Tools**
   Similar to this, SMEs need to embrace low-cost analytics platforms aligned with the capabilities of the localities without engaging in irrational investments unless it is culturally ready.

6. **Promote Policy Support for SME Analytics Adoption**
   The capacity-building program should be supported by local governments, chambers of commerce, and available training centers and subsidize digital tools to small restaurant businesses.

Limitations

The study is subject to several limitations that should be acknowledged for accurate interpretation:

1. **Cross-Sectional Design**
   The data were only gathered at one time, which makes it difficult to do causal observations regarding the changes in BDAC and DDC over time.

2. **Single-Sector and Region-Specific Sample**
   The emphasis on restaurants in Southern Punjab makes generalization less possible; it is likely that the results would be different in technologically advanced or urbanized environments.

3. **Composite Measurement of BDAC**
   BDAC was considered as some single construct, but it is possible that its subdimensions (technological infrastructure, human expertise, strategic alignment) have varying impacts.

4. **Self-Reported Data and Potential Bias**
   There is a possibility of responses being perceptual biased despite the protection of anonymity.

5. **Absence of Moderation Effects**
   This study did not have a means of testing how the relationship between BDAC and performance can be augmented by factors like alignment of strategy, environmental turbulence or leadership behavior.

Future Work

Building on the present findings, future research should consider the following extensions:

1. **Conduct Longitudinal Studies**
   The cause-effect relationships would be seen in tracking firms over time how BDAC, DDC, and performance co-develop and attain causal knowledge.
2. **Test BDAC Subdimensions Separately**
   It may be useful to study technological abilities, human abilities, and managerial abilities separately to gain a deeper insight.
3. **Expand to Other Sectors and Regions**
   The generalizability will be enhanced by cross-industry and multi-region data- larger metropolitan cities.
4. **Integrate Moderating Variables**
   The moderators that must be reviewed include alignment of business strategies, leadership style, innovation capability and dynamism of the environment.
5. **Apply Mixed-Methods Approaches**
   Case studies, or observational data, could be used to provide more information on cultural mechanisms.
6. **Evaluate Digital Maturity and Organizational Readiness Models**
   The proposed research can be improved next time on placing measures of digital readiness controls to determine whether cultural change is perceived before or after adoption of BDAC.

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Appendix

Variables	Items	Source
Big Data Analytics Capabilities	We have access to very large, unstructured, or fast-moving data for analysis We integrate data from multiple sources into a data warehouse for easy access We integrate external data with internal to facilitate analysis of business environment Our 'big data analytics' projects are adequately funded Our 'big data analytics' projects are given enough time to achieve their objectives	(Karaboga et al., 2023)
Data Driven Culture	In our firm, we consider data as a tangible asset. In our firm, we base our decisions on data rather than on instinct. In our firm, we override our own intuition when data contradict our viewpoints. In our firm, we assess and improve business rules in response to insights extracted from data. In our firm, we are encouraged to make decisions based on data.	(Karaboga et al., 2023)
Firm Performance	Reduces lead-time in production. Increases forecasting accuracy. Improves resource planning. Increases operational efficiency. Reduces the inventory level.	(Karaboga et al., 2023)