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Research paper

The Impact of Various Organizational Capabilities on Tourism Firm Performance: The Mediating Role of Big Data Analytics Capability

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Abstract

This study investigates the impact of various big data analytics capabilities on firm performance, through big data analytics capability (BDAC) (a combined set of capabilities) in Saudi Arabia's tourism sector. BDAC is modeled as a second-order construct formed by five capabilities: data-driven culture, technology, technical skills, managerial skills, and data-driven decision-making. The study basically examines the mediating role of BDAC. Data were collected through a structured questionnaire, resulting in 471 valid responses from professionals in tourism firms. Structural Equation Modeling (PLS-SEM) was used to analyze the data. The results show that managerial skills, technical skills, and a data-driven culture significantly improve performance both directly and indirectly through BDAC. However, data and technology capabilities had no significant impact on performance, either directly or through BDAC. These findings highlight the importance of human and cultural elements over technical infrastructure alone. The study contributes to theory by confirming that BDAC is a multidimensional construct and plays a partial mediating role. Practical implications suggest that tourism firms should invest in developing managerial talent and fostering a data-driven culture to maximize performance outcomes.

Keywords: *Managerial Skills; Technical Skills; Data-Driven Culture; Technology Capabilities; Data-Driven Culture; Firm Performance; Tourism.*

1. Introduction

Today's tourism sector delivers miscellaneous services via online platforms and social media to improve tourists' experiences (Kitsios et al., 2021). By 2027, 85% of the total revenue of the tourism sector will be generated through online sales (Statista, 2023). This extensive online existence contributed to the creation of large volumes of data about tourism companies, customers, services, and consumer preferences. Big data refers to information that is high in volume, velocity, and variety. It holds the potential to create business value (Wang et al., 2018). Big Data Analytics (BDA) is transforming the travel and tourism sector. Big data analytics involves extracting insights from large and often unstructured data sets. Through computational analysis, big data analytics reveals trends, patterns, and connections in human behavior (Yeoman, 2019). Predictive analytics identifies long-term trends. It shows which types of trips are popular and where demand will grow. This helps companies focus on the right products and destinations. Prescriptive analytics takes this further. It uses simulations to suggest the best business strategies. This helps firms increase profits and attract more customers (Epam, 2023). Big data analytics can enhance business decision-making and performance (Sousa et al, 2019). It helps tourism companies manage pricing, improve customer targeting, and gain a competitive advantage (Yeoman, 2019). To benefit from the myriad advantages of big data analytics, organizations need a set of management, talent, and technology capabilities. Such capabilities are essential to acquire, store, and analyze big data (Yasmin et al., 2020). Big Data Analytics Capability (BDAC) refers to an organization's ability to acquire, store, and analyze data. It depends on infrastructure, human talent, and data resources (Mikalef et al., 2020).

1.1. Problem statement

In 2016, Saudi Arabia launched Vision 2030. It is a national plan for future development. The vision is built on three main pillars: a vibrant society, a thriving economy, and an ambitious nation. The goal is to achieve long-term economic growth and social progress. Tourism is a

key focus in Vision 2030. The plan aims to reduce reliance on oil by diversifying the economy. It promotes Saudi Arabia as a global tourist destination. The country hopes to attract visitors by showcasing its culture, heritage, and natural beauty market (Vision 2030, 2025).

By 2032, the GDP contribution of the Tourism sector could hit SAR 635 billion, constituting 17.1% of the total economy. It is also expected that by 2032, about three million will be employed in the sector, doubling over the next 10 years. The sector's contribution to the economy and employment is anticipated to surpass the ambitious goals of the 2030 Vision strategic framework (WTTC, 2022). Accordingly, the future expansion of the Kingdom of Saudi Arabia is greatly reliant on its progress of the tourist sector, which has the prospective to diversify the economy and reduce the dependency on oil (Saudi Tourism Authority, 2022). Thus, a recession in the tourism sector causes unfavorable negative impacts on economic growth (Bahrawi et al., 2021). With its high predictive nature, BDA has the potential to help tourism companies quickly capture trends and be responsive in adapting to changes in trends. This means agility in response to the ongoing changing customer preferences and evolving external factors. Saudi Vision 2030 supports digital transformation (Vision 2030, 2025). This push helps drive growth in the big data market. In turn, Saudi Tourism companies generate massive amounts of data, transaction data, clickstream data, video data, and voice data, just to name a few. However, just collecting a large amount of data does not mean they are converted to meaningful information. Such data need to be collected, filtered, grouped, and analyzed to ultimately guide organizational decisions that lead to better performance (Popovič et al., 2018). Organizations, therefore, need to have various tangible, intangible, and human capabilities (Akter et al., 2016; Mikalef et al., 2020).

The above articulation underlines the practical gap, where tourism organizations have an extensive amount of data, but they still struggle with how and which organizational capabilities they need to utilize such big data to improve their performance. Furthermore, a theoretical gap is observed. The effectiveness of each capability may depend on the presence of a set of complementary organizational capabilities — namely, Big Data Analytics Capability — which enables firms to process, interpret, and act upon data insights strategically (Côrte-Real et al., 2020). Although the literature is rich with studies that examine the relationships between various capabilities and firm performance in various countries, it lacks studies that examine how having a collective set of capabilities can mediate the relationships between individual capabilities and firm performance, especially in the context of Saudi Arabia. The current research seeks to address the observed academic gaps. This can be done by examining the mediating role of Big Data Analytics Capability in the relationship between individual big data capabilities and firm performance.

The objectives are:

1) To examine the mediating role of Big Data Analytics Capability in the relationship between data-driven Capability (DD) and firm performance in the Saudi tourism sector.
2) To examine the mediating role of Big Data Analytics Capability in the relationship between technology capabilities (TECH) and firm performance in the Saudi tourism sector.
3) To examine the mediating role of Big Data Analytics Capability in the relationship between technical skills (TKSL) and firm performance in the Saudi tourism sector.
4) To examine the mediating role of Big Data Analytics Capability in the relationship between managerial skills (MSKL) and firm performance in the Saudi tourism sector.
5) To explore the mediating role of Big Data Analytics Capability in the relationship between data-driven culture (DDC) and firm performance.
6) To explore the impact of Big Data Analytics Capability on firm performance.

1.2. Big data analytics capability

For Saudi tourism firms, the critical question is how to build and apply combined analytic capabilities to improve performance. Many firms struggle not because they lack data, but because they fail to use it effectively (Mikalef et al., 2019, 2020). Korsten et al. (2022) note that success depends on acquiring the right capabilities. As a result, firms must build solid BDAC to unlock the full potential of big data. Companies also need rare and hard-to-copy capabilities (Mikalef et al., 2020). Studies confirm that BDAC adds real business value. It drives product innovation across many industries (Shaqrah & Alzighaibi, 2023). It helps firms turn data into a competitive advantage (AlNuaimi et al., 2021; Wided, 2023). Global tech leaders like Google, Facebook, and Amazon have succeeded by embedding BDAC into their daily operations (Bhatti et al., 2022). The definition of BDAC varies. Akhtar et al. (2019) describe it as the integration of human skills, technologies, and large datasets to produce insights using statistical and machine learning tools. Mikalef et al. (2020) define it as an organization's ability to collect, analyze, and act on data through structured processes and roles. BDAC is not a single skill. It is a combination of several organizational capabilities. These include technological infrastructure, human expertise, and cultural readiness. Yasmin et al. (2020) add that firms must integrate modeling, data sourcing, and organizational change to make analytics work. These elements must work together—not in isolation. Mikalef et al. (2019, 2020) emphasize that BDAC includes three distinct types of resources: tangible, human, and intangible. These categories reflect different sides of capability. If one is missing, the full benefit of BDA is lost. For example, having data tools without skilled staff or the right culture limits value creation (Gupta & George, 2016; Teece, 2014). These dimensions are not interchangeable. Each plays a unique role. For example, a firm with good systems but no analytics culture cannot reach high performance. Teece (2014) confirms that these resources do not always vary together. Firms must build all three types to benefit fully.

1.3. Hypotheses development

Big Data Analytics Capability (BDAC) is not a single function. It is a mix of connected capabilities. These include technology, skilled people, and a supportive culture (Mikalef et al., 2020). Each part—like technical skills, management ability, or data-driven mindset—can impact firm performance. But the real strength appears if they work together (Mikalef et al., 2019; Gupta & George, 2016). A company might invest in technology but gain little if it lacks trained staff or a data-friendly culture. Strong skills alone, without tools or decision systems, may also fall short. So, the impact of one part depends on the others. BDAC is this combined system. Its value lies in the synergy among resources. This synergy has more effect than any single part alone. Seeing BDAC as a full system is key to using its full power. Based on this, the mediating role of BDAC between various capabilities and firm performance can be explained as displayed in the research model, Figure 1.

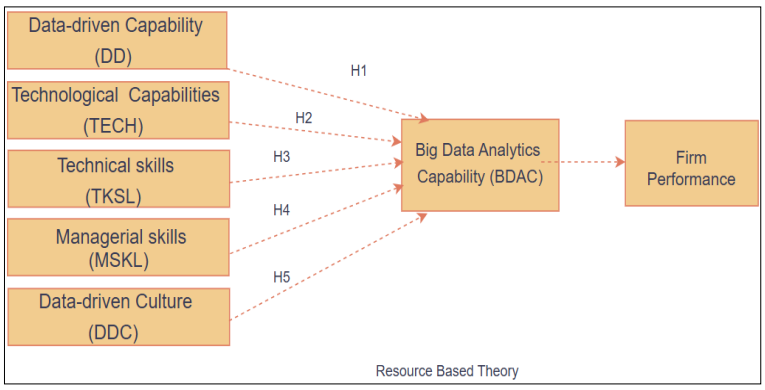

Fig. 1: Proposed Research Model.

1.4. Data-driven capability, big data analytic capability, and firm performance

Data-driven capability (DD) helps firms make better decisions. It shifts decisions from intuition to evidence. This leads to more accurate, timely, and strategic actions (Mikalef et al., 2020; Bag et al., 2021). In Saudi Arabia, DD improves flexibility and resilience in SMEs (Wided, 2023). In the UAE, better data access boosts environmental performance (AlNuaimi et al., 2021). In South Africa, DD enhances decision-making in logistics (Bag et al., 2021). But data alone does not improve performance. The real value comes from using data effectively. This requires Big Data Analytics Capability (BDAC) that combines people, tools, and culture to turn data into insights (Akhtar et al., 2019; Gupta & George, 2016). Without BDAC, the benefits of DD may be lost. Research shows that performance improves when data, skills, and systems work together (Mikalef et al., 2019; Teece, 2014). Furthermore, BDAC was found to be pivotal in optimizing SME performance (Orero-Blat et al., 2024). Such a relationship was also emphasized by Lin et al. (2025). This relationship fits the Resource-Based Theory (Wernerfelt et al, 1984). Firms gain an edge by using unique resources like DD and BDAC (Barney, 1991). BDAC depends on the availability of data, skilled people, appropriate tools, and how they work together (Cooren, 2020). Based on this, we propose:
H1: Big Data Analytics Capability mediates the relationship between data-driven capability (DD) and firm performance (FP) in Saudi tourism firms.

1.5. Technological capability, big data analytic capability, and firm performance

Technological capability (TECH) plays a key role in business success. It includes infrastructure, tools, and systems that support big data use. These tools allow real-time processing, advanced analytics, and secure data handling. In Saudi tourism firms, TECH may enhance efficiency, accuracy, and service delivery. Empirical studies confirm this impact. In Taiwan, BD technologies improved cash flow, profitability, and financial structure (Lee, 2020). In Norway, TECH influenced marketing capabilities (Mikalef et al., 2020). In China, TECH had a direct positive effect on business performance (Su et al., 2022). However, having technology is not enough. The real benefit comes from how firms use it. This is where analytics capability becomes essential. Such capabilities convert raw data into insights. It connects technology with people and strategy (Akhtar et al., 2019; Gupta & George, 2016). According to Resource-Based Theory, TECH is a valuable tangible resource (Barney, 1991). When used strategically, it supports performance (Barney, 1991). TECH is an essential capability that adds to the overall BDAC, which in turn adds to the firm's performance.
H2: Big Data Analytics Capability mediates the relationship between technological capability (TECH) and firm performance (FP) in Saudi tourism firms.

1.6. Technical capability, big data analytic capability, firm performance

Technical skills (TSKL) help firms use big data tools. Skilled staff can handle data, apply analytics, and create insights. In tourism, these skills improve service, speed, and accuracy. Studies confirm this impact. In Saudi Arabia, TSKL supports flexibility and resilience in SMEs (Wided, 2023). Staff skills drive supply chain innovation (Jaouadi, 2022). In India, BDA expertise improves supply chain performance (Cheng et al., 2022). In the UAE, human skills are key for digital change and collaboration (AlNuaimi et al., 2021). In Jordan, big data personnel capabilities have a significant positive impact on supply chain innovation capabilities (Jum'a et al., 2023). TSKL also boosts marketing and financial results (Mikalef et al., 2020; Lee, 2020). But skills alone are not enough. Without the right systems, insights may be lost. TSKL is an essential capability that adds to the overall big data capability, which in turn adds to the firm's performance. Furthermore, BDAC in general was found to improve supply chain innovation and thus financial performance (Bhatti et al., 2025).
The combined capabilities help firms use their skills better. It links people, tools, and processes. BDAC turns data into decisions (Akhtar et al., 2019; Gupta & George, 2016). From RBT, TSKL is a valuable resource (Barney, 1991). These views show that the combined capabilities connect TSKL to performance. Based on this, we propose:
H3: Big Data Analytics Capability mediates the relationship between technical skills (TSKL) and firm performance (FP) in Saudi tourism firms.

1.7. Managerial capability, big data analytic capability, and firm performance

Managerial skills (MSKL) are vital for firm performance. Skilled managers guide strategy, allocate resources, and oversee data use. In tourism, MSKL helps firms adapt, innovate, and compete. Many studies confirm this. In Saudi Arabia, MSKL improves strategic flexibility and resilience in SMEs (Wided, 2023). In Norway, it boosts marketing and competitive edge (Mikalef et al., 2020). In the UAE, managerial skills support digital transformation (AlNuaimi et al., 2021). In Taiwan, business development skills improve financial results (Lee, 2020). In India, MSKL strengthens supply chain performance and flexibility (Cheng et al., 2022). MSKL is an essential capability that adds to the overall analytic capability, which in turn adds to the firm's performance. Managers need tools and insights. Therefore, through Big Data Analytics Capability (BDAC), MSKL matters.

BDAC connects human skills, tools, and processes. It helps managers turn MSKL into action (Akhtar et al., 2019; Gupta & George, 2016), which then impacts the overall performance in the firm. From the Resource-Based View, MSKL is a key resource. It drives better use of other assets (Barney, 1991). The combined analytic capability helps managers use these interactions to improve results. Based on this, we propose:
H4: Big Data Analytics Capability mediates the relationship between managerial skills (MSKL) and firm performance (FP) in Saudi tourism firms.

1.8. Data-driven capability, big data analytics capability, firm performance

Data-driven culture (DDC) helps organizations make better decisions. It promotes using data over intuition. This culture supports alignment, innovation, and improved performance. Studies confirm its value. In Norway, DDC improved marketing and competitive advantage (Mikalef et al., 2020). In South Africa, it supported strategic logistics decisions (Bag et al., 2020). In Greece, DDC predicted firm performance (Mikalef et al., 2019). In the U.S., it enhanced analytic capabilities and business outcomes (Akter et al., 2016). Other scholars stressed the role of leadership, structure, and shared values in making DDC effective (McAfee & Brynjolfsson, 2012; Bamidele, 2022; Surbakti et al., 2020). However, culture alone is not enough. Firms also need systems to act on data. This is where the overall analytic capability matters. It connects culture, people, and tools. It helps turn data into decisions (Akhtar et al., 2019; Gupta & George, 2016). Through BDAC, DDC may be translated into better performance. The Resource-Based Theory sees DDC as a strategic resource. It supports faster, data-informed actions (Mikalef et al., 2020). Analytic capability strengthens this interaction and leads to stronger results. Based on this, we propose:
H5: Big Data Analytics Capability mediates the relationship between data-driven culture and firm performance in Saudi tourism firms.

2. Methodology

This study used a questionnaire survey. It helped capture patterns and explore relationships (Straub & Gefen, 2004). All items came from past validated studies (Akter et al., 2016; Gupta & George, 2016; Mikalef et al., 2020). A 5-point Likert scale was used. BDAC is a second-order construct. It includes five first-order capabilities. These are data-driven, technology, technical skills, managerial skills, and a data-driven culture. Each reflects a part of BDAC. By analyzing the structural model on SmartPLS, the second-order construct shows shared variance across its dimensions. This matches earlier studies on BDAC as a combined capability (Gupta & George, 2016; Mikalef et al., 2020). The survey was reviewed by one expert and two academics. A pilot study was done with 30 people. They worked in large tourism firms. Emails were used to invite them. Their feedback helped improve the survey. The main study got 471 valid responses. Senior IS executives were the target. Their contacts came from directories, networks, and forums. Phone calls explained the study and ensured privacy. Emails were sent with the survey link. Two reminders followed, spaced three weeks apart. Non-respondents got follow-up calls.

3. Results

The sample consisted of 471 respondents. Demographic data descriptive analysis is displayed in Table 1. Most participants were male (76.2%), while females made up 23.6%. The majority were between 30 and 49 years old, showing a mid-career workforce. Over half held a bachelor's degree (52.4%), and 38.2% had a master's or PhD. Most participants had 1 to 5 years of tenure (49.9%), with 36.1% having more than 5 years. In terms of big data analytics experience, 48.2% had over 5 years, and 30.1% had 1 to 5 years. Only 20.8% had less than one year of experience. The respondents mainly worked in medium-sized firms. About 42.9% were from companies with 50–249 employees, and 35.0% from firms with 10–49 employees. Only 13.8% were from large organizations with 250+ employees, and 8.1% worked in small firms with fewer than 10 employees.

Table 1: Demographic Data Descriptive Analysis

Category	Group	Frequency	Percentage (%)
Age Distribution	Below 30 years	64	13.6
	30 to 39 years	245	52.0
	40 to 49 years	122	25.9
	50 years and above	40	8.5
Gender Breakdown	Male	359	76.2
	Female	111	23.6
Educational Background	High school or a diploma	44	9.3
	Bachelor's degree	247	52.4
	Postgraduate (Master/PhD or higher)	180	38.2
Work Experience (Tenure)	Up to 1 year	66	14.0
	Between 1 and 5 years	235	49.9
	Between 5 and 10 years	86	18.3
	More than 10 years	84	17.8
Big Data Analytics Exposure	Less than 1 year	98	20.8
	1 to 5 years	142	30.1
	Over 5 years	227	48.2
Firm Size	1–9 employees	38	8.1
	10–49 employees	165	35.0
	50–249 employees	202	42.9
	250 employees or more	65	13.8

3.1. Measurement model for first-order constructs

Reliability and Validity tests for reflective constructs, Table 2. Constructs are reflective if the latent variable is presumed to cause the observed indicators (Mikalef et al., 2020). In the proposed model, FP, TSKL, MSKL, and DDC all represent reflective constructs. The results show good reliability and validity. Values of composite reliability are above 0.70. This confirms internal consistency. CR ranges from 0.907 to 0.935. All AVE values are above 0.50, showing good convergent validity. DDC has AVE = 0.687, FP = 0.662, MSKL =

0.743, and TKSL = 0.681. Discriminant validity is confirmed using the Fornell–Larcker criterion. Each construct's square root of AVE is higher than its correlations with other constructs. For example, DDC's square root of AVE is 0.829. This is higher than its correlations with FP (0.676), MSKL (0.731), and TKSL (0.744). VIF values are below 5. This means there is no multicollinearity problem. The highest VIF is 3.717. Overall, the constructs are reliable, valid, and ready for further analysis.

Table 2: Reflective Constructs, Composite Reliability, and Validity Tests

	DDC	FP	MSKL	TKSL
DDC	0.829			
FP	0.676	0.813		
MSKL	0.731	0.690	0.862	
TKSL	0.744	0.661	0.781	0.825
AVE	0.687	0.662	0.743	0.681
VIF	3.328	DV[a]	3.717	3.224
Composite reliability	0.916	0.907	0.935	0.914

[a] FP dependent variable.

Reliability and validity for Formative constructs. In Formative constructs, on the other hand, the indicators do not reflect the construct, but they cause it. Variations in indicators lead to simultaneous changes in the latent variable. The latent variable is formed by its indicators, Figure 2. Accordingly, formative constructs need other tests, rather than the regular reliability and validity tests used for reflective constructs. Weights and collinearity are valid methods to assess the quality of the formative constructs DD and TECH. The results show acceptable reliability for most formative indicators. Outer loadings for most items are above 0.70, which indicates good item contribution. For the DD construct, items DD2 (0.848), DD3 (0.810), and DD5 (0.783) show strong loadings. However, DD4 (0.478) and DD6 (-0.909) have low or negative loadings. DD6 is also statistically significant (p = 0.000), but its large negative weight suggests it may distort the construct and should be considered for removal. Indicator weights help assess each item's relative contribution. In DD, weights are mostly low and non-significant. DD2 and DD3 contribute more, but not strongly. DD6 has a significant and large negative weight, which is problematic. In contrast, the TECH construct performs better. All outer loadings are strong (≥ 0.744). All weights are significant (p < 0.05), and values range from 0.179 to 0.312. This indicates balanced contribution across TECH items. VIF values for all indicators are below 5. This confirms no multicollinearity issues. The highest VIF is 3.141 (DD2), which is acceptable. In summary, TECH indicators are valid and reliable. The DD construct shows issues, especially with DD6 and DD4. These indicators will be kept as recommended by (Gupta & George, 2016; Mikalef et al., 2020).

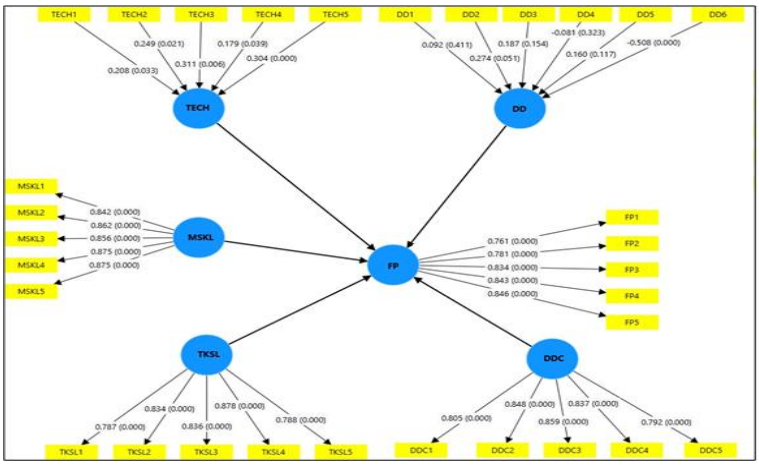

Fig. 2: Measurement Model for First Order Constructs.

Note: Outer loadings (Reflective constructs), Weights (Informative Constructs), P-Values.

3.2. Measurement model for second-order constructs

The second-order construct BDAC includes five first-order indicators (Figure 3. These are DD, TECH, MSKL, TSKL, and DDC. Outer loadings are all above 0.79, showing strong contributions. DDC has the highest loading (0.907), followed by MSKL (0.925) and TSKL (0.885). This confirms good indicator relevance. Weights show the relative importance of each component. MSKL (0.359, p = 0.001) and DDC (0.366, p = 0.000) have significant and strong contributions. TSKL is also significant (0.200, p = 0.025). DD (0.084, p = 0.249) and TECH (0.114, p = 0.151) are not statistically significant. This suggests their role in BDAC is weaker. All VIF values are below 5, indicating no multicollinearity. The highest VIF is 3.534 for MSKL. In summary, BDAC is a valid second-order construct. MSKL, DDC, and TSKL are the most influential components. DD and TECH contribute less to BDAC in this model.

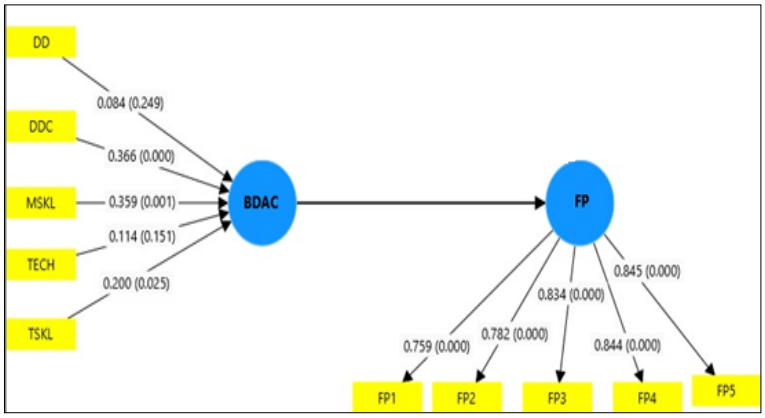

Fig. 3: Second Order Model Measurement.

To test the hypotheses, a structural equation model was conducted.

Table 3: Direct Effect on Firm Performance, Without the Mediator

	Sample mean (M)	T statistics	P values
DD -> FP	0.061	1.087	0. 277
DDC -> FP	0.272	4.337	0.0 00
MSKL -> FP	0.266	3.572	0.00 0
TECH -> FP	0.086	1.389	0. 165
TKSL -> FP	0.151	2.254	0.0 24

Table 4: Indirect Effect on Firm Performance through BDAC

	Total effect (M)	T statistics	P-values
DD	0.037	1.169	0.243
DDC	0.164	3.999	0.000*
MSKL	0.168	2.933	0.003*
TECH	0.046	1.390	0.165
TKSL	0.092	2.016	0.044*

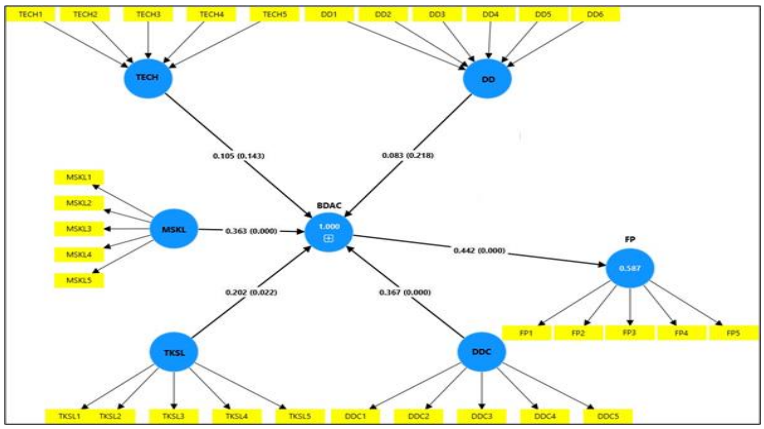

Fig. 4: Structural Model, BDAC Included.

As Table 4 and Figure 4 illustrate, the indirect effect shows mixed support for the mediating role of BDAC. The mediation effect of BDAC between data-driven culture (DDC) and firm performance is strong and significant (p = 0.000). This supports H5. Managerial skills (MSKL) also show a significant indirect effect through BDAC (p = 0.003), supporting H4. Technical skills (TKSL) show a weaker but still significant mediation effect (p = 0.044), supporting H4. However, data-driven decision-making (DD) and technology capabilities (TECH) have non-significant indirect effects (p = 0.243 and p = 0.165, respectively). Thus, H1 and H2 are rejected. The indirect effect of ACBSA is also non-significant (p = 0.738). These results indicate that only some capabilities contribute to firm performance through BDAC. Culture, managerial, and technical skills matter most.

Table 5: Hypotheses Testing

Hypothesis	Path	Mediation via BDAC	Result
H2	DD → BDAC → FP	Not significant	Rejected
H3	TECH → BDAC → FP	Not significant	Rejected
H4	TKSL → BDAC → FP	Significant	Supported
H5	MSKL → BDAC → FP	Significant	Supported
H6	DDC → BDAC → FP	Highly significant	Supported

4. Discussion

The first objective examines whether data-driven capability (DD) improves firm performance (FP) through Big Data Analytics Capability (BDAC). The goal was to understand whether using data for decision-making helps tourism firms perform better. The results showed that

DD has no significant indirect effect on FP through BDAC (effect = 0.037, p = 0.243). This means BDAC does not mediate the relationship between DD and FP. This leads to rejection of H1. The direct effect was also not significant (path = 0.06, p = 0.277). DD alone does not lead to better performance in the tourism sector. One reason may be the low maturity of data practices in some firms. Another reason could be poor implementation or a lack of skills. Without proper tools, data quality, or trained people, DD may not produce results. DD might need to work with other capabilities to create value. These include managerial and technical skills. Prior studies in other countries showed that DD can help performance. For example, DD improved resilience in Saudi SMEs (Wided, 2023). It also supported logistics in South Africa (Bag et al., 2021) and marketing in Norway (Mikalef et al., 2020). In this study, the same result was not observed. According to RBT, resources only add value if used well. If the Data is not of high quality or misaligned with goals, it brings little benefit.

The second objective examines whether technology capability (TECH) improves firm performance (FP) through Big Data Analytics Capability (BDAC). The results showed no significant indirect effect of TECH on FP through BDAC (effect = 0.046, p = 0.165), leading to rejection of H2. This means that BDAC does not mediate the TECH–FP relationship. The direct effect was also not significant (path = 0.086, p = 0.165). TECH alone does not improve performance. One reason could be low maturity in tech use. Another could be poor implementation. Firms may have tools but lack skills or proper processes. Technology must be combined with other resources, like human skills or culture. Without this integration, the value of TECH remains limited. Other studies found different results. In Taiwan, TECH improved its financial performance (Lee, 2020). In Norway, it supported marketing capabilities (Mikalef et al., 2020). In China, TECH had a direct effect on performance (Su et al., 2022). In this study, the same result was not observed. According to RBT, resources only add value if used well. If the technology is outdated or misaligned with goals, it brings little benefit.

The insignificant impact of Data-Driven Capability (DD) and Technological Capability (TECH) on firm performance through the mediating role of BDACs may stem from several barriers. A major factor is the limited maturity of data analytics among many Saudi Arabian tourism firms. These organizations often lack essential infrastructure—such as advanced data management systems or cloud platforms—needed to fully leverage big data initiatives (Gupta & George, 2016; Mikalef et al., 2020). Common challenges in developing countries, including inadequate infrastructure, scarce skilled personnel, absence of strong data privacy regulations, the digital divide, and the high costs of technology adoption, further constrain progress (Barsha & Munshi, 2023).

Resistance to data-driven decision-making also persists, particularly in firms with traditional, family-owned, or hierarchical structures (Ajao & Ejokehuma, 2021), where intuition often outweighs data insights (McAfee & Brynjolfsson, 2012). Another critical issue is poor implementation quality. Access to technology or data alone does not ensure improved performance unless these resources are properly aligned with organizational goals and processes (Akter et al., 2016; Sindarov et al., 2023). In some cases, firms rely on fragmented or outdated systems that lack compatibility with modern tools, resulting in inefficiencies (Hirschlein et al., 2022).

Moreover, DD and TECH capabilities may only generate significant value when integrated with complementary organizational capabilities, such as managerial skills and a data-driven culture (Mikalef et al., 2020). This suggests that isolated investments in technology or analytics are unlikely to deliver performance benefits without a supportive environment and holistic implementation strategy

The third objective examines whether technical skills capability (TSKL) improves firm performance (FP) through Big Data Analytics Capability (BDAC). It explored how staff expertise in big data tools supports tourism firms. Skilled employees help process data faster and more accurately. This leads to better decisions and operations.

The results showed a significant indirect effect (effect = 0.092, p = 0.044). This means that BDAC mediates the TSKL–FP relationship. TSKL improves performance when combined with other big data capabilities. This supports the idea that technical skills alone are not enough. They need to work within a full analytics system. BDAC helps turn technical know-how into performance outcomes. Other studies agree with the current results. Wided (2023) showed that TSKL supports resilience in Saudi SMEs. Jaouadi (2022) found that skilled staff improve innovation. Cheng et al. (2022) linked TSKL to better supply chain results. Lee (2020) showed that technical experts improve financial indicators. From RBT, TSKL is a valuable resource. BDAC provides the structure to make skills useful.

The fourth explored managerial skills (MSKL) and their impact on firm performance (FP) through BDAC. It examined how managers lead big data projects. Strong MSKL helps firms apply analytics in useful ways. The results showed a significant direct effect (path = 0.266, p = 0.000). The indirect effect through BDAC was also significant (effect = 0.168, p = 0.003). This means BDAC mediates the MSKL–FP relationship. MSKL improves FP in two ways. First, it helps managers use big data directly. Second, it strengthens BDAC, which also boosts performance.

Other studies confirm this. Wided (2023) found that MSKL improves resilience. Mikalef et al. (2020) linked MSKL to marketing performance and advantage. AlNuaimi et al. (2021) showed that managers lead e-business change. Lee (2020) found that MSKL boosts financial outcomes in Taiwan. Cheng et al. (2022) linked MSKL to supply chain success in India. These findings support the current results. From RBT, MSKL is a vital resource. It helps firms adapt, compete, and manage data effectively.

The fifth objective focused on how a data-driven culture (DDC) affects firm performance (FP) through BDAC. DDC means using data for decisions. It shows how staff act with facts, not guesswork. It improves speed, accuracy, and innovation. The results showed a strong direct effect from DDC to FP (0.272, p = 0.000). The indirect effect through BDAC was also significant (0.164, p = 0.000). This means DDC works in two ways. First, it helps directly. Second, it builds BDAC, which also boosts FP. This proves DDC matters. A strong culture leads to better data use. It also supports other capabilities. Other studies confirm this result. Mikalef et al. (2020) found that DDC helps marketing and advantage. Bag et al. (2020) showed it helps make decisions in logistics. Mikalef et al. (2019) linked DDC to performance in Greece. Akter et al. (2016) did the same in the U.S. McAfee and Brynjolfsson (2012) said leaders must use data, not intuition. Surbakti et al. (2020) said DDC supports tools and people. Bamidele (2022) assured strong culture needs a strong structure. From RBT, DDC is a rare resource. It helps firms act smart and win.

In a similar study conducted in China, different dimensions of big data capabilities were found to have a positive impact on firm performance by influencing sensing, seizing, and reconfiguring (mediators) (Wu & Zhang, 2021).

Furthermore, the findings on BDA capabilities can be extended beyond operational performance to areas such as marketing and governance. In marketing, BDAC enables firms to enhance customer segmentation, personalization, and predictive analytics, which improve customer engagement and satisfaction. For example, leveraging data-driven insights allows tourism firms to design targeted promotional campaigns and dynamic pricing strategies, improving competitiveness (Theodorakopoulos et al., 2025).

From a governance perspective, effective BDAC implementation requires robust data governance frameworks to ensure compliance with privacy and security regulations (Abraham et al., 2019). In emerging markets, where regulatory structures may still be evolving, organizations must proactively adopt the best practices in data ethics, accountability, and transparency, aligning with global standards such as GDPR (General Data Protection Regulation) to build trust with stakeholders.

5. Recommendation and conclusion

Firms should invest in building a strong BDAC. This includes technology, skills, and culture. Managers need training to lead data projects. Technical staff should gain data skills. Firms must upgrade their analytics tools. A data-driven culture should be encouraged. Use data, not guesswork, to make decisions. Combine all five capabilities for the best results. BDAC should match the firm's goals. Monitor progress and adjust when needed. Promote teamwork and data sharing across departments. These steps help boost performance through better analytics.

The current study examined the impact of big data capabilities on firm performance. It focused on tourism firms in Saudi Arabia. Five key capabilities were tested: data-driven capability, technology capabilities, managerial and technical skills, as well as data-driven culture. The role of BDAC as a combined capability was also explored. Results showed that data-driven and technology capabilities do not have a direct or indirect effect. However, technical skills, managerial skills, and a data-driven culture significantly influenced performance, directly and through BDAC. The combined set of capabilities played a strong mediating role in technical skills, managerial skills, and data-driven culture relationships. This confirms that combining capabilities creates greater value. The study supports Resource-Based Theory. It highlights the need for integrated analytics development. Tourism firms should not rely on one capability alone. Instead, they should build a balanced and mature BDAC. This helps them compete better and perform stronger in a data-driven market.

Though the study focused on tourism firms in Saudi Arabia, the findings may apply to other emerging markets and data-driven industries. Regions like the Gulf, Southeast Asia, and Africa face similar issues. These include low analytics maturity, skill shortages, and high technology costs. Industries such as retail, healthcare, and manufacturing also depend on data and face comparable challenges. Future research should test these results in different sectors and countries to improve generalizability.

References

[1] Abraham, R., Schneider, J., & Vom Brocke, J. (2019). Data governance: A conceptual framework, structured review, and research agenda. *International Journal of Information Management*, *49*, 424–438. https://doi.org/10.1016/j.ijinfomgt.2019.07.008.

[2] Ajao, M. G., & Ejokehuma, J. O. (2021). Ownership Structure and Financial Performance of Manufacturing Firms In Sub-Saharan Africa. *Facta Universitatis, Series: Economics and Organization*, 187. https://doi.org/10.22190/FUEO210319013A.

[3] Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? *International Journal of Production Economics*, *182*, 113–131. https://doi.org/10.1016/j.ijpe.2016.08.018.

[4] AlNuaimi, B. K., Khan, M., & Ajmal, M. M. (2021). The role of big data analytics capabilities in greening e-procurement: A higher order PLS-SEM analysis. *Technological Forecasting and Social Change*, *169*, 120808. https://doi.org/10.1016/j.techfore.2021.120808.

[5] Authority, S. T. (2022). *Home \textbar Saudi Tourism Authority*. https://www.sta.gov.sa/en/home.

[6] Bag, S., Luthra, S., Mangla, S. K., & Kazancoglu, Y. (2021). Leveraging big data analytics capabilities in making reverse logistics decisions and improving remanufacturing performance. *The International Journal of Logistics Management*, *32*(3), 742–765. https://doi.org/10.1108/IJLM-06-2020-0237.

[7] Bhatti, S. H., Ahmed, A., Ferraris, A., Hirwani Wan Hussain, W. M., & Wamba, S. F. (2022). Big data analytics capabilities and MSME innovation and performance: A double mediation model of digital platform and network capabilities. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-05002-w.

[8] Bahrawi, S., Abulkhair, M., & Mensi, S. (2021). *The Covid-19 Pandemic Impact on the Saudi Arabia Tourism Sector: An Accountancy Approach*. 20.

[9] Bamidele, R. (2022). *Organizational Culture* (pp. 284–292).

[10] Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108.

[11] Cooren, F. (2020). Beyond entanglement:(Socio-) materiality and organization studies. *Organization Theory*, *1*(3), https://doi.org/10.1177/2631787720954444.

[12] Gupta, M., & George, J. F. (2016). Toward the development of a big data analytics capability. *Information & Management*, *53*(8), 1049–1064. https://doi.org/10.1016/j.im.2016.07.004.

[13] epam. (2023). *Big Data in Travel and Tourism: Guide for Transforming the Industry*. https://anywhere.epam.com/business/big-data-in-tourism-and-travel.

[14] Hirschlein, N., Meckenstock, J.-N., & Dremel, C. (2022). Towards Bridging the Gap Between BDA Challenges and BDA Capability: A Conceptual Synthesis Based on a Systematic Literature Review. *Hawaii International Conference on System Sciences 2022 (HICSS-55)*. https://aisel.aisnet.org/hicss-55/os/org_issues_in_bi/9. https://doi.org/10.24251/HICSS.2022.748.

[15] Jaouadi, M. H. O. (2022). Investigating the influence of big data analytics capabilities and human resource factors in achieving supply chain innovativeness. *Computers & Industrial Engineering*, *168*, 108055. https://doi.org/10.1016/j.cie.2022.108055.

[16] Jum'a, L., Zimon, D., & Madzik, P. (2023). Impact of big data technological and personal capabilities on sustainable performance on Jordanian manufacturing companies: The mediating role of innovation. *Journal of Enterprise Information Management*, *37*(2), 329–354. https://doi.org/10.1108/JEIM-09-2022-0323.

[17] Korsten, G., Aysolmaz, B., Turetken, O., Edel, D., & Ozkan, B. (2022). *ADA-CMM: A Capability Maturity Model for Advanced Data Analytics*. http://hdl.handle.net/10125/79362. https://doi.org/10.24251/HICSS.2022.032.

[18] Kitsios, F., Kamariotou, M., Karanikolas, P., & Grigoroudis, E. (2021). Digital Marketing Platforms and Customer Satisfaction: Identifying eWOM Using Big Data and Text Mining. *Applied Sciences*, *11*(17), 8032. https://doi.org/10.3390/app11178032.

[19] Lee, S.-M. (2020). Impact of Big Data Analytics Capability and Strategic Alliances on Financial Performance. In L. C. Jain, S.-L. Peng, & S.-J. Wang (Eds.), *Security with Intelligent Computing and Big-Data Services 2019* (pp. 49–63). Springer International Publishing. https://doi.org/10.1007/978-3-030-46828-6_6.

[20] Lin, J., Wu, S., & Luo, X. (Robert). (2025). How does big data analytics capability affect firm performance? Unveiling the role of organisational resilience and environmental dynamism. *European Journal of Information Systems*, *34*(3), 502–528. https://doi.org/10.1080/0960085X.2024.2375262.

[21] McAfee, A., & Brynjolfsson, E. (2012). Big Data: The Management Revolution. *Harvard Business Review*. https://hbr.org/2012/10/big-data-the-management-revolution.

[22] Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics and firm performance: Findings from a mixed-method approach. *Journal of Business Research*, *98*, 261–276. https://doi.org/10.1016/j.jbusres.2019.01.044.

[23] Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. (2020). Exploring the relationship between big data analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities. *Information & Management*, *57*(2), 103169. https://doi.org/10.1016/j.im.2019.05.004.

[24] Popovič, A., Hackney, R., Tassabehji, R., & Castelli, M. (2018). The impact of big data analytics on firms' high value business performance. *Information Systems Frontiers*, *20*(2), 209–222. https://doi.org/10.1007/s10796-016-9720-4.

[25] Saudi Tourism Authority. (2022). *Saudi Tourism Authority*. https://www.sta.gov.sa/en/home.

[26] Shaqrah, A., & Alzighaibi, A. (2023). Linking knowledge management capabilities and the mediating role of the big data capabilities for enterprise value-adding processes. *VINE Journal of Information and Knowledge Management Systems*, *53*(1), 64–79. https://doi.org/10.1108/VJIKMS-05-2020-0087.
[27] Sindarov, A., Vafaei-Zadeh, A., Syafrizal, S., & Chanda, R. C. (2023). Big data analytical capability and firm performance: Moderating effect of analytics capability business strategy alignment. *International Journal of Applied Decision Sciences*, *16*(6), 663–685. https://doi.org/10.1504/IJADS.2023.134188.
[28] Sousa, M. J., Pesqueira, A. M., Lemos, C., Sousa, M., & Rocha, Á. (2019). Decision-Making based on Big Data Analytics for People Management in Healthcare Organizations. *Journal of Medical Systems*, *43*(9), 290. https://doi.org/10.1007/s10916-019-1419-x.
[29] Straub, D., & Gefen, D. (2004). Validation Guidelines for IS Positivist Research. *Communications of the Association for Information Systems*, *13*. https://doi.org/10.17705/1CAIS.01324.
[30] Statista. (2023). *Travel & Tourism—Saudi Arabia*. https://www.statista.com/outlook/mmo/travel-tourism/saudi-arabia.
[31] Su, X., Zeng, W., Zheng, M., Jiang, X., Lin, W., & Xu, A. (2022). Big data analytics capabilities and organizational performance: The mediating effect of dual innovations. *European Journal of Innovation Management*, *25*(4), 1142–1160. https://doi.org/10.1108/EJIM-10-2020-0431.
[32] Surbakti, F. P. S., Wang, W., Indulska, M., & Sadiq, S. (2020). Factors influencing effective use of big data: A research framework. *Information & Management*, *57*(1), 103146. https://doi.org/10.1016/j.im.2019.02.001.
[33] Orero-Blat, M., Palacios-Marqués, D., Leal-Rodríguez, A. L., & Ferraris, A. (2024). Beyond digital transformation: A multi-mixed methods study on big data analytics capabilities and innovation in enhancing organizational performance. *Review of Managerial Science*, *19*(2), Article 2. https://doi.org/10.1007/s11846-024-00768-8.
[34] Teece, D. J. (2014). The Foundations of Enterprise Performance: Dynamic and Ordinary Capabilities in an (Economic) Theory of Firms. *Academy of Management Perspectives*, *28*(4), 328–352. https://doi.org/10.5465/amp.2013.0116.
[35] Theodorakopoulos, L., Theodoropoulou, A., & Bakalis, A. (2025). *Utilizing Big Data for Improved Targeting and Personalization for Digital Marketing Purposes in the Tourism Industry: A Comprehensive Review*. https://doi.org/10.1007/978-3-031-78471-2_17.
[36] Tourism Economics. (2021). *Driving the Tourism Recovery in Saudi Arabia*. Tourism Economics. https://s3.amazonaws.com/tourism-economics/craft/Google_Saudi_Arabia_Final_Small.pdf.
[37] Vision 2030. (2025). *2030: Strategic objectives and vision realization programs*.
[38] Wang, Y., Kung, L., & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*, *126*, 3–13. https://doi.org/10.1016/j.techfore.2015.12.019.
[39] Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207.
[40] Wided, R. (2023). IT Capabilities, Strategic Flexibility and Organizational Resilience in SMEs post-COVID-19: A Mediating and Moderating Role of Big Data Analytics Capabilities. *Global Journal of Flexible Systems Management*, *24*(1), 123–142. https://doi.org/10.1007/s40171-022-00327-8.
[41] WTTC. (2021). *Global Economic Impact and Trends 2021*. WTTC.
[42] Wu, D., & Zhang, Y. (2021). Impact of Big Data Analytic Capability on Firm Performance: The Moderating Effect of IT-Strategic Alignment. *2021 5th Annual International Conference on Data Science and Business Analytics (ICDSBA)*, 115–119. https://doi.org/10.1109/ICDSBA53075.2021.00033.
[43] Yahoo Finanace. (2023, October 24). *Tourism Industry Big Data Analytics Reshape the Future of Travel with an Estimated Market Revenue of US$ 486.6 Billion by 2033 | Future Market Insights, Inc.* Yahoo Finance. https://finance.yahoo.com/news/tourism-industry-big-data-analytics-141000038.html.
[44] Yasmin, M., Tatoglu, E., Kilic, H. S., Zaim, S., & Delen, D. (2020). Big data analytics capabilities and firm performance: An integrated MCDM approach. *Journal of Business Research*, *114*, 1–15. https://doi.org/10.1016/j.jbusres.2020.03.028.
[45] Yeoman, I. (2019). Big Data. *Journal of Revenue and Pricing Management*, *18*(1), 1–1. https://doi.org/10.1057/s41272-019-00191-9.