ARTIFICIAL INTELLIGENCE

AI-Powered Business Intelligence and Advanced Decision Analytics for Improving Enterprise Performance and Digital Competitiveness in Saudi Arabia

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Abstract

Saudi enterprises are spending heavily on dashboards, data platforms and artificial intelligence (AI), yet the link between these investments and measurable performance is often assumed rather than demonstrated. This review asks how AI-powered business intelligence and advanced decision analytics create enterprise value, which conditions govern that value in Saudi organisations, and how managers can steer analytics investment towards digital competitiveness. A systematic integrative review was conducted of 30 peer-reviewed journal studies published between 2020 and 2025. It was anchored by a survey of business analytics experts in Saudi firms that examined innovation capabilities as a mediator, and by a study of AI capability, data-driven culture and firm performance. Eleven of the 30 studies report evidence from the Kingdom. Three findings stand out. First, analytics and AI improve performance mainly through better and faster decisions, organisational learning and innovation, rather than through technology alone, and data-driven culture and employee analytics skills repeatedly act as the transmission belt. Second, Saudi evidence shows that organisational factors, management support, security and human capital matter more for adoption and performance than infrastructure per se, while recent panel studies associate AI and digital transformation with stronger environmental, social and governance results among listed firms. Third, the appropriate division of labour between managers and algorithms depends on how structured and uncertain a decision is. The paper proposes a decision-value framework that links capability resources, decision modes, performance outcomes and competitiveness, together with a matrix for allocating decisions between automation, augmentation and human judgement, and an agenda for research in the Kingdom.

1 Introduction

Business intelligence has moved a long way from monthly reports produced by a central IT unit. Modern platforms combine structured transaction data with unstructured text, sensor feeds and external signals, and AI techniques are now embedded in forecasting, anomaly detection, recommendation and natural-language querying. Successive waves of business intelligence and analytics research have tracked this shift from structured data, through unstructured content, to mobile and sensor data (Eggert & Alberts, 2020). For enterprises, the promise is no longer simply better reporting but better decisions: decisions taken earlier, on fuller evidence and with clearer awareness of uncertainty.

Saudi Arabia offers a demanding setting for that promise. The national transformation agenda places digital capability at the centre of economic diversification, and listed companies are expected to show progress on both financial and sustainability measures. Large organisations in energy, finance, retail, logistics and government have invested in enterprise data platforms, while small and medium-sized

enterprises are being encouraged to adopt analytics and AI. Yet adoption does not guarantee value. Studies in the Kingdom report that many firms struggle to obtain the full benefit of business analytics (Alaskar, 2023) and that the implementation of big data analytics in some institutions has produced less than optimal performance (Aseeri & Kang, 2023).

The international literature offers part of the explanation. A meta-analysis of 42 studies confirmed a relationship between big data analytics capability and firm performance but found that it depends on the type of performance measured and on the country of origin of the sample (Ansari & Ghasemaghaei, 2023). Analytics capability on its own may be insufficient unless employees possess the skills to use it (Farivar et al., 2022), and data quality appears to be a condition for extracting value from analytics initiatives (Côrte-Real et al., 2020). AI, meanwhile, raises a distinct question about who decides: the manager, the algorithm or both together (Leyer & Schneider, 2021).

Existing reviews of Saudi digital transformation tend to concentrate on technology adoption or on specific functions such as process automation and document management. What is missing is an account that follows analytics from capability to decision to performance, and then asks how this chain operates under Saudi organisational conditions. This review provides such an account. Its contribution is threefold: it synthesises the mechanisms through which AI-powered business intelligence affects enterprise performance; it consolidates the Saudi evidence on the conditions that shape adoption and value; and it proposes a decision-value framework and a decision-allocation matrix that managers can use to direct analytics investment.

After the research questions and review method, Sections 4 to 6 take up each question in turn. Implications, priorities for further study and the limits of the evidence are considered afterwards, before the paper closes with its conclusions.

2 Research aim, objectives and questions

This review sets out to explain how AI-powered business intelligence and advanced decision analytics can improve enterprise performance and digital competitiveness in Saudi Arabia, and to translate that explanation into a framework that can guide investment and governance. The objectives are: (1) to identify the mechanisms that connect analytics and AI capabilities with decision outcomes and enterprise performance; (2) to synthesise evidence on the conditions that shape analytics adoption and value in Saudi organisations; (3) to clarify how decisions should be divided between human judgement and AI; and (4) to integrate the results into a decision-value framework with measurable indicators.

Three research questions guide the synthesis. RQ1: Through which mechanisms do business intelligence, analytics and AI capabilities improve decision-making and enterprise performance? RQ2: Which technological, organisational and environmental conditions shape the adoption and performance effects of analytics and AI in Saudi enterprises? RQ3: How can Saudi enterprises organise AI-powered decision analytics so that capability investments translate into sustained performance and digital competitiveness?

3 Review methodology

Because the relevant evidence is methodologically diverse, a systematic integrative design was adopted. It includes structural equation models from manager surveys, panel regressions on listed firms, interpretive structural modelling, Delphi and analytic hierarchy studies, grounded theory,

meta-analysis and conceptual decision models. An integrative design allows these to be synthesised while preserving information about method, context and outcome.

The searches, carried out in November 2026 through a bibliographic metadata service, combined capability terms ("business intelligence", "business analytics", "big data analytics capability", "artificial intelligence capability", "decision support") and outcome terms ("firm performance", "decision quality", "strategic decision-making", "competitive advantage") and, where useful, context terms ("Saudi Arabia", "Gulf", "SMEs"). Narrower searches within individual publishers' records then recovered relevant studies that the broad queries had ranked low.

Eligible studies were English-language articles in peer-reviewed journals, published in final form between 2020 and 2025, that dealt with the organisational use of business intelligence, analytics or AI and offered empirical, review or conceptual evidence bearing on at least one research question. Studies of consumer attitudes, clinical applications and purely algorithmic contributions without organisational outcomes were excluded, as were conference papers, editorials and records whose bibliographic details or abstracts could not be verified. Priority was given to studies set in Saudi Arabia, and studies from other countries were retained where they clarified mechanisms or decision models.

Two studies anchored the search. The first surveyed 386 business analytics experts in Saudi firms and examined innovation capabilities as a mediator between analytics capabilities and firm performance (Alaskar, 2023). The second modelled AI capability as a higher-order resource and tested data-driven culture as a mediator of its effect on firm performance (Fosso Wamba et al., 2024). Forward and backward searching from these anchors, combined with the database queries, produced the final corpus of 30 studies. Of these, 11 report Saudi evidence; 11 are quantitative or multicriteria studies from other or unspecified settings; and eight are reviews, meta-analyses, bibliometric, qualitative or conceptual studies.

Each study was coded for country, sector, method, capability construct, mediating mechanism, outcome and conditions. Coding was then synthesised in three passes: mechanisms connecting capability to performance, conditions observed in the Saudi studies, and models of human–AI decision allocation. Reported results are presented as published, and no new data were generated.

4 From analytics capability to enterprise performance

The first mechanism is decision quality and speed. Business analytics is valued because it supports strategic planning and decision-making in complex and dynamic conditions, and an affordance-based analysis identified 20 affordances through which analytics supports strategic planning outcomes, mapped across the social and technical dimensions of the organisation (Kurpiela & Teuteberg, 2024). Survey evidence from 175 Chinese firms showed that both IT-business alignment and big data analytics capability support strategic decision speed and quality, but that crisis conditions altered these effects: the criticality of the COVID-19 event weakened the influence of analytics capability on decision quality, whereas its disruptiveness strengthened the effect of analytics capability on both decision speed and quality (Chen et al., 2022). Decision outcomes are therefore not a fixed return on analytics capability but depend on the nature of the situation in which decisions are taken.

The second mechanism is learning and innovation. Grounded theory research found that big data analytics capability contributes to firm performance through organisational learning, and that the capability is incomplete if any of its dimensions is missing (Garmaki et al., 2023). In Saudi firms, in-

novation capabilities carried the effect of two technological factors, information quality and IT infrastructure, through to firm performance, while organisational factors had a highly significant direct effect (Alaskar, 2023). Among Saudi managers, big data analytics capabilities affected economic, environmental and social performance, and strategic agility partly mediated the relationship, with stronger effects in more creative environments (Alyahya et al., 2023). These studies suggest that analytics creates value by expanding what the organisation can learn, sense and change, not merely by producing information.

The third mechanism is culture and skills. AI capability, modelled as tangible, intangible and human resources, affected firm performance directly and through data-driven culture, and configurational analysis indicated that while different combinations of AI resources could lead to high performance, AI infrastructure was a crucial resource (Fosso Wamba et al., 2024). In supply chain organisations, supply chain process integration enhanced analytics capability, but analytics capability alone did not improve firm performance unless complemented by employees' analytics skills (Farivar et al., 2022). Data quality plays a similar enabling role: responses from 618 European and American firms indicated that better data quality was needed to unlock the value of Internet of Things and analytics capabilities (Côrte-Real et al., 2020).

The magnitude of these effects varies. The meta-analysis noted above found that performance type moderated the capability-performance relationship in the expected direction, while country of origin moderated it in the opposite direction to that hypothesised (Ansari & Ghasemaghaei, 2023). Using multicriteria methods with case firms in Pakistan, one study found that analytics capabilities are interdependent, with infrastructure ranked highest, followed by management and human resource capabilities, and that they relate more strongly to operational than to market performance (Yasmin et al., 2020). In a sample of 387 employees of Croatian IT firms, business intelligence affected firm performance both directly and indirectly, through firms' uptake of big data analytics and of blockchain (Pancić et al., 2023).

For AI specifically, evidence links adoption to performance while warning against simple expectations. US-listed firms whose annual reports showed a stronger focus on AI showed higher net profitability and net operating efficiency, together with better returns on marketing spending (Mishra et al., 2022). A survey of 226 managers in US high-tech firms found that technological, organisational and environmental factors shaped AI adoption intensity, which was positively correlated with firm performance, and that technological turbulence moderated the antecedents of adoption (Chen & Tajdini, 2025). Firm-level and patent data, however, revealed a diverging pattern: AI was associated with innovation gains, especially for larger latecomer firms, while productivity gains were found for smaller firms already operating at the productivity frontier, the opposite of what a catch-up hypothesis would predict (Kopka & Fornahl, 2024). Productivity benefits from AI therefore appear to depend on prior capability.

Success models from information systems research help to organise these mechanisms. A consolidated and expanded business intelligence success model, tested on 217 observations, defined success in terms of capability, information quality, user satisfaction, decision-making culture and system use (Ramirez-Aristizabal & de Oliveira Moraes, 2024). Behavioural evidence adds that habit was the most important influence on both the intention to use business intelligence tools and actual use in decision-making among 152 respondents, while several factors expected from technology acceptance theory were not confirmed (Kašparová, 2023). Use, in other words, has to become routine before analytics can shape decisions consistently.

Table 1 summarises the principal mechanism studies. In answer to RQ1, business intelligence, analytics and AI improve enterprise performance through four linked mechanisms: faster and better-informed decisions, organisational learning and innovation, strategic agility, and the conversion of capability into routine use through culture, skills and data quality.

Table 1. Principal evidence on mechanisms and conditions linking analytics and AI to performance

Study	Setting and sample	Design	Key finding
Alaskar (2023)	Saudi firms, 386 analytics experts	Survey; PLS-SEM	Organisational factors dominate; innovation capability mediates technology effects
Fosso Wamba et al. (2024)	Firms using AI	PLS-SEM and fsQCA	AI capability raises performance directly and via data-driven culture
Alyahya et al. (2023)	Saudi Arabia, 410 managers	Survey; SEM	Analytics capability improves sustainable performance via strategic agility
Asiri et al. (2024)	Saudi SMEs	Survey; PLS-SEM	Security and management support shape adoption; adoption improves performance
Badghish and Soomro (2024)	Saudi SMEs, six sectors	Survey; multi-group PLS	TOE factors drive AI adoption; AI improves operational and economic performance
Hamdouni (2025)	100 listed Saudi firms, 2015–2024	Panel regression	AI adoption positively associated with ESG scores
Chen et al. (2022)	175 Chinese firms	Matched survey	Crisis features moderate effects of analytics on decision speed and quality
Garmaki et al. (2023)	Data-driven firms	Grounded theory	Analytics capability works through organisational learning
Farivar et al. (2022)	240 supply chain managers	Survey	Analytics capability needs employee analytics skills
Ansari and Ghasemaghaei (2023)	42 studies	Meta-analysis	Capability–performance link moderated by performance type and country

5 Conditions shaping analytics value in Saudi enterprises

The Saudi studies converge on the primacy of organisational conditions. In the anchor survey, organisational factors had a highly significant effect on firm performance, whereas IT infrastructure and information quality had no significant direct effect and influenced performance only through innovation capabilities (Alaskar, 2023). An earlier survey of 220 IT managers found that relative advantage, top management support and compatibility encouraged intentions to use big data analytics in supply chain management, that competitive pressure amplified these effects, while neither complexity nor organisational readiness had a supported effect (Alaskar et al., 2021).

Government organisations reveal similar priorities. A Delphi study with business intelligence experts in two Saudi government organisations, followed by analytic hierarchy weighting, ranked organisational compatibility and IT, system and data collection capabilities as the greatest challenges to business intelligence effectiveness, with decisional uncertainty and organisational culture ranked lowest (Alkraiji, 2020). In Saudi universities, organisational culture significantly affected the people dimension of big data analytics but not the systems dimension, and both social and technical subsystems were correlated with strategic decision-making (Aseeri & Kang, 2023).

Small and medium-sized enterprises face particular constraints. Among Saudi SMEs in services and manufacturing, big data security and management support influenced perceived ease of use and usefulness, perceived ease of use drove adoption, and adoption significantly influenced business performance (Asiri et al., 2024). In a multi-sector survey of SME managers, five conditions were significant for AI adoption: perceived relative advantage, fit with existing operations, sustainable human capital, pressure from markets and customers, and support from government, which in turn influenced operational and economic performance, with medium-sized firms showing a stronger link between relative advantage and adoption than small firms (Badghish & Soomro, 2024).

Barriers have also been mapped structurally. Interpretive structural modelling of big data analytics adoption in Saudi manufacturing produced a hierarchy in which some barriers exert strong driving power over others, identifying critical points that firms should address first (Alorfi & Alsaadi, 2025). Among medium-large supply chain firms, complexity, security, IT expertise and external support were positively related to firm performance, whereas relative advantage, compatibility, top management support, organisational resources, competitive pressure and privacy were not (Hamed & Manaf Bohari, 2022). The contrast with other Saudi results shows that the conditions which matter can differ between the decision to adopt and the eventual performance effect.

Evidence from listed firms extends the picture beyond surveys. A panel study of 100 listed Saudi firms over 2015 to 2024 found a significant positive association between AI implementation and ESG scores, particularly in the environmental and social dimensions, with panel causality tests indicating that AI adoption Granger-caused ESG performance and not the reverse (Hamdouni, 2025). Using a digital transformation index coded manually from the annual reports of non-financial companies on the Saudi exchange, another study found a positive association between digital transformation and ESG performance and singled out big data analytics and blockchain as the technologies most closely tied to ESG gains (Bajaher & Asiri, 2025). These results suggest that analytics capability contributes not only to operating performance but also to the sustainability profile on which investors increasingly judge competitiveness.

International comparisons help interpret the Saudi pattern. Technology-organisation-environment factors also shaped AI adoption intensity in US high-tech firms (Chen & Tajdini, 2025), and a bibliometric analysis of 2,442 business intelligence articles found that research integrating business intelligence with decision-making processes and human resources management remains underexplored, with output concentrated in the United States and China (Mekimah et al., 2024). Saudi studies therefore contribute evidence from an under-represented setting, but most rely on cross-sectional manager surveys.

In answer to RQ2, the conditions that shape analytics value in Saudi enterprises are predominantly organisational: management support, compatibility with existing processes, human capital and skills, and a data-driven culture. Security and data protection emerge as specific technological conditions, government and external support as environmental enablers, and firm size as a moderator. Infrastructure is necessary but, on the Saudi evidence, produces value only when organisational capability converts it into innovation and decisions.

6 Organising decision analytics: A decision-value framework

Turning capability into performance requires deliberate choices about how decisions are made. Organisations can use AI-enabled decision solutions as tools or novelties, for augmentation or automation, and on a voluntary or mandatory basis, and each combination carries different

consequences for managerial roles, responsibilities and acceptance (Leyer & Schneider, 2021). A systematic review of AI in strategic decision-making under uncertainty concluded that AI can amplify problems inherent in the decision process rather than reduce them, so that human responsibility increases and new capabilities are needed (Trunk et al., 2020). For ill-structured and uncertain decisions, a model integrating managerial intuition with AI specifies when and how each mode should be combined so that the strengths of one offset the weaknesses of the other (Vincent, 2021).

Figure 1 presents the decision-value framework that follows from the synthesis. On the left are capability resources: data and infrastructure, analytics and AI tools, and people with analytics skills. These form an AI-powered business intelligence capability whose effect depends on three conversion mechanisms identified in Section 4: data-driven culture, organisational learning and innovation, and routine use. Conversion produces decision outcomes, namely speed, quality and agility, which in turn drive enterprise performance across operational, financial and sustainability dimensions. Digital competitiveness is the cumulative result. Saudi conditions frame the whole chain: management support and compatibility, human capital, security and data protection, government and external support, and firm size.

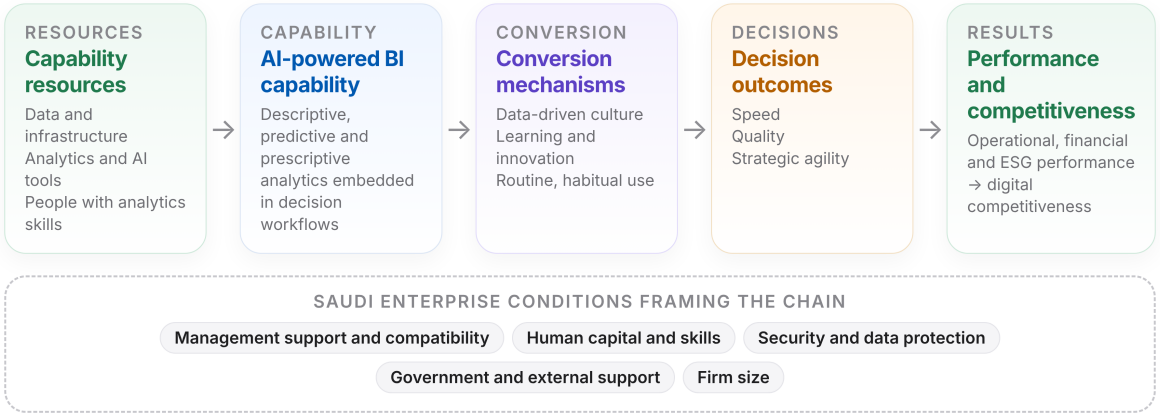

Figure 1. Decision-value framework linking AI-powered business intelligence capability to enterprise performance and digital competitiveness

Figure 2 addresses the allocation problem. It crosses decision structure, from well-structured and repetitive to ill-structured and novel, with uncertainty and stakes. Well-structured, lower-stakes decisions such as routine replenishment or credit pre-screening are candidates for automation with monitoring. Well-structured but high-stakes decisions call for augmentation, in which the algorithm recommends and an accountable manager decides. Ill-structured decisions with moderate stakes suit exploration, where analytics generates options and scenarios. Ill-structured, high-stakes decisions such as market entry or major investment remain judgement-led, with AI used to test assumptions rather than to choose. The matrix draws on the augmentation-automation distinction and on the intuition-AI model rather than on empirical clustering, and is offered as a design aid.

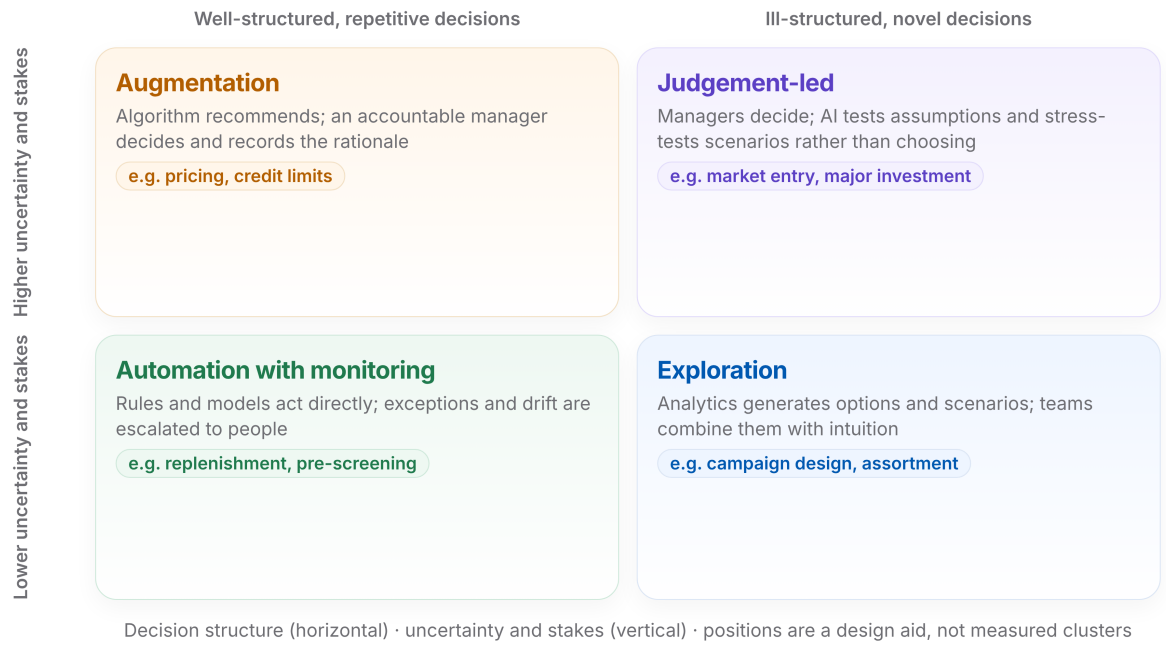

Figure 2. Decision-allocation matrix for automation, augmentation, exploration and judgement-led decisions

Table 2 translates the framework into levers and indicators. Four propositions summarise the argument for testing. First, the performance effect of analytics capability in Saudi enterprises is mediated more strongly by organisational conversion mechanisms than by infrastructure. Second, the effect is larger where employee analytics skills and data quality are high. Third, decision outcomes improve most when the allocation of decisions between automation, augmentation and judgement matches decision structure and stakes. Fourth, firms that build analytics capability report stronger sustainability performance, which reinforces their competitiveness with investors and partners.

Table 2. Decision-value framework: components, levers and indicators

Component	Management levers	Illustrative indicators	Supporting evidence
Capability resources	Data platforms, AI tools, analytics talent	Data quality scores; share of staff with analytics skills	Fosso Wamba et al. (2024); Côrte-Real et al. (2020)
Conversion mechanisms	Data-driven culture, learning routines, habitual use	Use frequency in decisions; learning reviews completed	Garmaki et al. (2023); Kašparová (2023)
Decision outcomes	Decision inventory; allocation by structure and stakes	Decision cycle time; forecast and decision accuracy	Chen et al. (2022); Leyer and Schneider (2021)
Enterprise performance	Targets linked to analytics programmes	Operating efficiency; innovation output; ESG scores	Mishra et al. (2022); Hamdouni (2025)
Saudi conditions	Management sponsorship, security, SME support	Executive sponsorship; security incidents; support uptake	Alaskar (2023); Asiri et al. (2024)

In answer to RQ3, Saudi enterprises can organise AI-powered decision analytics by investing in conversion mechanisms alongside technology, by allocating decisions explicitly according to

structure and stakes, by measuring decision outcomes as well as system use, and by linking analytics programmes to both operational and sustainability performance.

7 Discussion, implications and limitations

Taken together, the evidence challenges a common assumption in digital investment planning: that better platforms produce better performance. Across settings, the effect of analytics depends on what the organisation does with it. Saudi evidence sharpens this conclusion, because infrastructure and information quality had no direct effect on performance in the anchor survey and mattered only through innovation (Alaskar, 2023), while culture shaped the people dimension of analytics rather than its systems (Aseeri & Kang, 2023). For leaders, the implication is that budgets for analytics should include skills, process redesign and decision governance, not only software and data storage.

The review also brings together theoretical lenses that are usually applied separately. Saudi adoption studies rely mainly on the technology-organisation-environment framework (Alaskar, 2023; Badghish & Soomro, 2024), performance studies on resource-based and dynamic capability reasoning (Alyahya et al., 2023; Fosso Wamba et al., 2024), and other work on information processing or sociotechnical systems theory (Aseeri & Kang, 2023; Farivar et al., 2022). The decision-value framework suggests how they fit together: adoption theories explain whether capability is acquired, resource theories explain why it can become a source of advantage, and information processing and sociotechnical views explain how it is converted into decisions. Treating these as stages of one chain, rather than as competing explanations, may help future Saudi studies design models that connect adoption with realised performance.

The findings also clarify the meaning of digital competitiveness at firm level. It is not the possession of advanced tools but the capacity to make better decisions faster than rivals and to show credible progress on sustainability. The association between AI adoption and ESG performance among listed Saudi firms (Hamdouni, 2025) suggests that analytics can strengthen this capacity in the eyes of investors, although the mechanisms behind the association, whether better measurement, better operations or better disclosure, remain to be established.

For managers, three practical steps follow. Begin with a decision inventory that classifies key decisions by structure and stakes and assigns an appropriate mode from Figure 2. Build data-driven culture and analytics skills deliberately, through training, role design and leadership example, because these mediate the effect of capability. Measure decision speed and quality, not just dashboard use, and link analytics initiatives to explicit operational and sustainability targets. For policymakers, support programmes for SMEs should combine funding for tools with assistance in skills and security, consistent with the role of government support and security found in Saudi studies (Asiri et al., 2024; Badghish & Soomro, 2024).

Several research priorities emerge. Longitudinal and multi-source studies in Saudi enterprises are needed to move beyond cross-sectional manager surveys and to test the causal sequence from capability to decision outcomes to performance. Decision-level studies should measure the accuracy and timeliness of specific decisions before and after analytics deployment. Comparative work across sectors and between public and private organisations would show whether organisational conditions differ in importance. Research should examine how generative AI interfaces alter habit-driven use of business intelligence. Finally, the link between analytics and ESG outcomes deserves mechanism-level investigation.

The review has limitations. The corpus is limited to 30 studies, and the Saudi subset is dominated by cross-sectional surveys using structural equation modelling, so causal claims are tentative. Some international studies come from settings that differ from Saudi Arabia in institutions and market structure. Several claims had to be checked against abstracts because full texts were not accessible, and selection and coding were carried out by one reviewer without a second coder. Both the framework and the decision matrix are the author's synthesis and still need to be tested empirically.

8 Conclusion

AI-powered business intelligence can improve enterprise performance in Saudi Arabia, but only when organisations convert capability into decisions. The evidence reviewed here shows that this conversion runs through data-driven culture, learning and innovation, skills, data quality and routine use, and that in Saudi enterprises organisational factors such as management support, compatibility, human capital and security govern both adoption and value. The decision-value framework and the decision-allocation matrix offer a way to plan analytics investment around these mechanisms.

Digital competitiveness will belong to firms that treat analytics as a decision capability rather than a technology purchase. For Saudi enterprises, that means pairing investment in platforms with investment in people and governance, allocating decisions deliberately between algorithms and managers, and measuring results in decisions, performance and sustainability.

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