



“Eliminating data silos with business intelligence: The role of organizational culture and leadership in Jordan’s insurance sector”

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ELIMINATING DATA SILOS WITH BUSINESS INTELLIGENCE: THE ROLE OF ORGANIZATIONAL CULTURE AND LEADERSHIP IN JORDAN'S INSURANCE SECTOR

Abstract

Business intelligence systems are becoming vital in Jordan's insurance sector, driving efficiency, compliance, and data-driven decisions. This study investigates how institutional, technical, and cultural conditions influence the effectiveness of business intelligence implementation, especially in overcoming persistent data silos and fragmented legacy systems. A structured survey was conducted between September and December 2024 across major Jordanian cities, targeting BI managers, IT specialists, compliance officers, and operations analysts within insurance companies. A stratified sampling approach was used to ensure representation by firm size, BI maturity, and data silo severity, yielding 260 valid responses from 360 distributed questionnaires (72% response rate). This focus on professionals directly involved in BI implementation and evaluation ensured the relevance and depth of insights.

Partial Least Squares Structural Equation Modeling revealed that BI integration significantly reduced data silos ($\beta = -0.482, p < 0.0001$), improved operational efficiency ($\beta = 0.413, p = 0.0003$), strengthened regulatory compliance ($\beta = 0.391, p = 0.0005$), and enhanced decision-making effectiveness ($\beta = 0.428, p < 0.0002$). Mediation analysis confirmed that improved data quality partially explained BI's impact on decision-making ($\beta = 0.216, p = 0.0012$). Moreover, the positive effects of BI were amplified in organizations with strong data-driven cultures ($\beta = 0.183, p = 0.0026$) and active top management support ($\beta = 0.194, p = 0.0021$). These findings underscore that technological solutions alone are insufficient; effective BI outcomes rely on an alignment of systems, culture, and leadership, offering critical insights for digital transformation in regulated industries.

Keywords

business intelligence, data silos, decision-making, compliance, efficiency, insurance, Jordan, analytics, integration, governance

JEL Classification

C83, L86, M15, G22

INTRODUCTION

In today's data-driven landscape, integrating and leveraging information is essential for competitiveness and regulatory compliance, particularly in heavily regulated sectors like insurance. Yet many organizations still face entrenched data silos that disrupt information flow, slow decision-making, and weaken responsiveness. This is especially critical in insurance, where real-time data are vital for underwriting, claims, fraud detection, and meeting strict reporting standards.

In Jordan, these issues are heightened by outdated systems, departmental silos, and inconsistent data governance. Many insurers operate fragmented and incompatible platforms that undermine efficiency and transparency, increasing compliance risks as regulators demand timely, cross-functional reporting. Although business intelligence (BI) systems promise to bridge these gaps, they often fall short in environments marked by institutional inertia, misaligned technology, and

cultural resistance. As a result, delays, compliance failures, and limited strategic flexibility persist – not because BI tools are unavailable, but because the supporting conditions for success are weak.

This study examines how technological, organizational, and cultural factors must work together for BI systems to achieve their intended impact. Data silos, inefficiency, compliance gaps, and poor decision-making are not separate problems; they are interconnected symptoms of weak integration. By developing a unified model, this research investigates how BI can simultaneously reduce silos, enhance efficiency, strengthen compliance, and improve decision quality, with data-driven culture and top management support serving as key moderators. This integrated perspective aims to show how BI, when effectively embedded in organizational and cultural systems, can unlock strategic value in Jordan's insurance sector during its digital transformation.

1. LITERATURE REVIEW AND HYPOTHESES

The digitalization of the insurance market is increasingly reliant upon the strategic application of data. In their pursuit of efficiency, compliance with intricate regulations, and the ability to provide tailored service, Business Intelligence (BI) systems have become a key priority as insurers integrate them for the purposes of consolidating varied sources of information. These systems, developed for the purposes of consolidating disparate information sources, have the promise of reshaping decision-making as well as operating effectiveness. Yet, in both international as well as geographical contexts, the deployment of BI has produced inconsistent outcomes, leaving doubt as to its effectiveness within the real world. The extant literatures demonstrate an increasing awareness that, although powerful capabilities exist through BI, they are not assured. Instead, they are mediated by organizational, technical, as well as socio-cultural variables influencing how information is gathered, regulated, and interpreted (Ezmigna et al., 2024; Morshed et al., 2024b).

One of the main challenges of effectively utilizing BI systems is the persistence of silos. These silos, fueled by incompatible systems, fragmented processes, and departmental autonomy, hinder the free flow of information within an organization (Jeske & Olson, 2024; Sousa et al., 2024). In insurance, where risk modeling, customer profiling, and managing claims all rely on unified data, such fragmentation causes delays, inconsistency, and subpar decision-making. The issue is not purely of a technical infrastructure nature; it is also entrenched within organizational inertia as well as poorly aligned incentives (Amini et al.,

2021; Quan et al., 2024). Functional departments, for many, guard their information assets as sources of power as well as legitimacy, hence the political sensitivities involved in integrating them (Abu-AlSondos et al., 2024; Yang et al., 2023).

In Jordan, the problem is further aggravated by a reliance on old IT systems and low degrees of interdepartmental interfacing (Morshed et al., 2024a). These systems are often not designed for growth or for new demands on the information they must handle, nor are they often replaced as a consequence of budget uncertainty or risk aversion (Moro et al., 2022). Underwriting, claims, finance, and customer service departments, therefore, function technologically independently, with different databases, applications, and formats. This segmentation prevents enterprise-wide analytics, and companies have to depend on hand-led reconciliation – a time-consuming, error-ridden process that degrades data quality and makes operational expenses balloon (Jha et al., 2021; Karagiannidou & Wittenberg, 2022).

Academics have consistently decried the operational risks created by such silos, such as duplication of the record, inconsistent key measure definitions, and delayed reporting (Khalil et al., 2022). These inefficiencies not only diminish productivity, but they also weaken an insurer's ability to meet external reporting demands as well as internal governance requirements. In environments with stringent compliance, such as the regulation of insurance within Jordan, companies need to produce auditable, real-time, cross-departmental reports (Cornwell et al., 2023). The persistence of silos makes this practically impossible, giving rise to non-compliance, penalties, as well as reputational risk (Cornwell et al., 2023).

The failure to generate clean, consolidated information further restricts strategic analytics. The value of the information, according to Liu and Lu (2021) and Hussain et al. (2023), is not its volume, but rather its synthesis into timely, actionable insight. Predictive modeling, behavioral segmentation, and detecting fraud all need quality, cross-functional information inputs – conditions negated by siloed systems. This restriction is most pernicious within the insurance scenario, where actuarial precision and real-time decision support are mission-critical (Shiyyab & Morshed, 2024). In Jordan, companies lack the ability to advance beyond simple reporting, let alone predictive capabilities, through analytic immaturity and silo-driven information blindness (Alghizzawi et al., 2025; Ashal & Morshed, 2024).

Whereas BI is often presented as a technical solution for such fragmentation, the literature offers a more nuanced scenario. Multiple studies argue that technology itself is insufficient for breaking through the cultural and institutional impediments toward integration. Silos from a sociotechnical perspective are not inadvertent, but rather are supported by entrenched patterns of responsibility, accountability, and workflow resistant to disruption. This explains, for example, why technologically competent companies frequently fail to capture the value of BI – adoption hinges on role, routine, and power challenges that many companies are ill-prepared to meet (Morshed, 2024; Sequeira et al., 2024).

The extant literature increasingly indicates that BI failure is frequently caused by underestimating organizational resistance. According to Williams et al. (2023) and Kar and Kushwaha (2023), mere availability of BI tools does not mean that they will be employed effectively. If departments distrust shared information, lack analysis capabilities, or fear being scrutinized, BI systems can be overlooked, even rejected. Data are left isolated, then as cross-functional insight remains a promise unfulfilled. In Jordanian companies, such dynamics are fueled by top-down leadership structures as well as by short-term technical solutions as preferable over long-term organizational change (Hashem & Starr, 2025; Ungureanu et al., 2021).

Implementation structures such as the Technology-Organization-Environment (TOE) model have served well in identifying interdependencies necessary for BI achievement. The model highlights not only the need for technological preparedness but also the role of organizational culture and external regulatory enforcement (Al Hadwer et al., 2021). Tellingly, many insurance companies, though, bring BI systems on board reactively – only to meet new reporting requirements, for example, or to follow competitors – instead of as part of a strategic integrated transformation. This tends to translate into piecemeal implementation, designed not for alignment with business processes, nor for seamless integration with current systems (Chittipaka et al., 2023).

In addition, even after companies overcome initial technological challenges, many do not develop the people infrastructure and cognitive frames required for BI utility maximization. Companies often ignore the need for developing employees as data literate or for establishing means for getting continuous input for improving analytics over time (Tavera Romero et al., 2021). Without these enablers, BI systems will be underexploited, or worse, improperly exploited, resulting in erroneous decisions based on miscalculated metrics and over-interpreted visualizations (Ali Albasheir, 2023). In insurance, there is risk not only of mispricing and fraudulent activity, but also of policyholder equity and regulatory compliance.

Therefore, the literature establishes that while there is great promise for BI systems in breaking down information silos and driving enterprise insight, their effective implementation hinges on a nuanced interplay between technical, organizational, and institutional variables. Integration is not a function of loading new software, but of re-engineering how information is generated, appreciated, and responded to within an organization. In situations such as Jordan, where structural, cultural, and technological restrictions overlap, such changes need ongoing commitment as well as inter-functional cooperation, rather than stand-alone IT projects.

In addition to integration, the operational benefits of BI systems have gained significant attention, especially for their ability to make processes leaner

through efficiency and real-time process optimization. Literature indicates that properly implemented BI systems decrease turnaround times, eliminate workflow bottlenecks, and enhance resource allocation through providing transparency within internal processes (Yesodha et al., 2023). In the insurance business, processes like claims approval or underwriting frequently have multiple layers of approvals and documentation, for which BI systems can streamline routine processes, highlight exceptions, and expedite approvals (Challa et al., 2024). These systems enable predictive workload balancing as well as the early identification of issues – features of value to insurers who face big volumes of data and volatile service demand.

However, the benefits of operating BI are not consistently achieved. Studies continually identify vast differences between organizations, even within the same industry. In several small- and medium-sized insurance companies across the MENA region, BI implementation does not bring anticipated improvements in performance because it is only partly integrated with current systems, there is no appropriate human capital, or there is only slight correspondence with business priorities (Al-Zahrani & Alasmari, 2025). BI dashboards might be installed but not implemented for routine operations, or systems might not be integrated into central decision-making processes. A Jordanian insurance company is an example: though BI implementation cut claims handling time by 28%, cost savings did not occur because redundant human tasks and rigid staffing patterns remained unaltered (Jaradat et al., 2024). The example highlights the necessity for uniting technical adoption with the redesign of operations and human capital transformation.

The literature positions BI capabilities within a strategic framework, frequently through the lens of the RBV. In accordance with the view of the RBV, BI systems, if deeply embedded within an organization's routines and not easily imitable by competitors, can constitute sustained competitive advantage (Eyadat et al., 2025). However, such an advantage depends on the ability of an organization to absorb and make use of analytic insights. In organizations where there is low data literacy and where analytics is disconnected from strategy development, BI acts as a passive repository instead of an active decision-making support mech-

anism (Rahman, 2023). Contrarily, organizations that integrate BI outputs into strategic thinking – through feedback mechanisms, cross-functional cooperation, and constant evaluation – have higher levels of innovativeness as well as adaptability.

In regulated industries such as insurance, BI is becoming increasingly positioned as a tool for compliance and governance as well. With increasingly complex regulation and the need for higher levels of transparency, insurers need to track a vast range of measurements through departments in real time. BI systems provide tools for assuring data lineage, traceability, and auditability, diminishing the risk of breaches of regulation as well as internal controls (Chatterjee et al., 2024). Jordan is where such is especially relevant, as the Central Bank is enforcing increased regulation as well as real-time reporting requirements from insurance providers. Empirical evidence indicates that insurers employing BI tools are generally better able to comply with changing requirements, have fewer instances of violation, as well as are best prepared for audit (Alghizzawi et al., 2024).

But such a utility is reliant on the quality of data as well as interpretability. As a string of scholars cautioned, poor-quality input data can compromise the accuracy of otherwise highly advanced BI systems, generating erroneous outputs or spurious confidence in compliance reporting (Qayyum et al., 2023). There is also a danger of automation causing complacency – having managers rely on dashboard metrics without subjecting their underlying assumptions or anomalies to critical examination (Qayyum et al., 2023). Without sound data governance processes and human intervention, BI systems can comply with regulation in letter but not in substance.

This extends to the ethical aspects of BI adoption. With BI systems increasingly infused with algorithmic models and predictive analytics, new issues of fairness, transparency, and accountability emerge (Choi & Kim, 2024). In the insurance domain, where computerized choices can impact premiums, risk classes, and coverage entitlement, hidden algorithms can lead to biased and discriminatory judgments (Stepenko et al., 2022). These are especially problematic where there is a weak framework of data protection, as is frequently the

situation within developing economies. In Jordan, the lack of an overarching data ethics framework increases the prospect of unregulated algorithmic decision-making, with attendant risks of reputational and legal challenges (Jain et al., 2023).

One of the other threads running through the literature is the value of adaptability within BI systems. In environments of fast-paced regulatory, technological, and customer behavior change, rigid BI implementations soon fall out of place or out of step (Biagi et al., 2021).

For Jordanian insurers in particular, whose regional competitiveness, altered regulation, and client expectations call for constant learning and flexible data systems strategies demand, Business intelligence is seen today not only as a technological instrument but also as a dynamic capacity supporting resilience, learning, and long-term development (Azzam et al., 2021; Rane et al., 2024).

The report emphasizes how highly dependent BI systems are, even if they have great interconnection from strategic analytics and driving innovation to improving operations and ensuring compliance. Success with BI depends on organizational alignment, talent capital, and ethical governance as much as technology-dependent factors. Maximally releasing the value of BI requires a contextualized, integrated strategy that surpasses simple technical solutions in an environment like Jordan's insurance market, where structural deficits coexist with underdevelopment of the digital.

Accordingly, this study aims to develop an integrated model examining how BI systems reduce data silos, enhance operational efficiency, strengthen regulatory compliance, and improve decision-making in Jordan's insurance sector, while taking into account the roles of data-driven culture and top management support.

This study puts forward the following hypotheses:

- H1: BI integration significantly reduces data silo persistence in Jordanian insurance firms.*
- H2: BI integration significantly improves operational efficiency in Jordanian insurance firms.*

H3: BI integration significantly enhances regulatory compliance in Jordanian insurance firms.

H4: BI integration significantly improves decision-making effectiveness in Jordanian insurance firms.

H5: Data quality mediates the effect of BI integration on decision-making effectiveness.

H6: A data-driven culture strengthens the positive effect of BI integration on operational efficiency.

H7: Top management support strengthens the positive effect of BI integration on regulatory compliance.

2. METHODOLOGY

This study utilizes a quantitative, cross-sectional survey method to measure the influence of Business Intelligence (BI) deployment on core organizational outcomes across Jordan's insurance industry. The key areas of reducing information silos, increasing operational efficiency, regulatory compliance, and augmenting decision-making power are the focal points. The cross-sectional design is utilized to collect data from several firms at one point to provide a snapshot view of existing BI usage and influence over a diverse sample. The methodology is ideally used to cater to the fast-changing digital situation prevalent in Jordan's insurance industry, where BI systems are coming to be viewed as an essential necessity for handling sophisticated data environments and meeting compliance requirements.

The population of the study includes professionals working on BI activities within Jordanian insurance organizations, such as BI managers, IT professionals, compliance professionals, analysts, and operations managers. These professionals have been chosen based on their direct participation in planning, operating, and assessing BI systems and data processes. A purposeful stratified sampling technique was used to ensure a representative sample across key firm characteristics, including organizational size (small, medium, large), BI

Table 1. Respondent profiles

Category	Subgroup	Target Sample	Actual Responses (72%)
Firm Size	Small (< 50 employees)	120	86
	Medium (50-200 employees)	130	94
	Large (> 200 employees)	110	80
BI Maturity Level	Early-stage	100	71
	Partially Integrated	130	95
	Fully Integrated	130	94
Data Silo Severity	Low	110	78
	Moderate	130	94
	High	120	88
Total		360	260

maturity stage (early-stage, partial, and fully integrated), and data silo severity (low, moderate, high). This stratification improves the external validity of the results by reflecting the organizational diversity within the sector. From a total of 360 distributed questionnaires, 260 complete and valid responses were collected, resulting in a 72% response rate, which is above the recommended threshold for structural equation modeling in exploratory research.

The questionnaire was designed based on validated instruments from previous studies on BI systems and organizational performance, with items adapted to the specific regulatory, technological, and cultural context of the Jordanian insurance industry. The survey was composed of six core sections, covering organizational demographics, BI integration level, data silo persistence, operational efficiency, regulatory compliance, and decision-making effectiveness. Additionally, it measured mediating and moderating variables, including data quality, top management support, and data-driven culture. All items were measured using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to facilitate consistency in responses. The instrument was pilot-tested in August 2024 with a sample of 20 professionals to assess clarity and reliability. Based on their feedback, minor adjustments were made to improve the wording and flow of questions. The average completion time was approximately 11 minutes, helping to minimize respondent fatigue while maintaining comprehensiveness.

Survey data were collected between September and December 2024. This period was chosen to avoid seasonal slowdowns and to align with firms' operational and reporting cycles, during

which BI systems are heavily utilized. Sending the survey during this interval also raised the possibility that participants might consider the current BI systems used in their companies. Google Forms and Qualtrics distributed the survey online to guarantee accessibility over Jordan's several areas – including Amman, Irbid, Zarqa, and Aqaba. One participated fully voluntarily and anonymously. Respondents were given a clear explanation of the goal of the study, data use, and confidentiality policies before starting the survey. They were advised of their right to stop at any time before answering. Nobody individually identified any data. Middle East University, Jordan, granted ethical permission for the study in line with internationally recognized research ethics guidelines (Dehghanpour & Herrmann, 2021).

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The reason for this choice was that it is best at dealing with models with numerous latent variables, mediation and moderation effects, as well as reflective and formative indicators. PLS-SEM is best used for exploratory studies such as this one, where theory development and practical lessons are paramount. It is also non-sensitive to non-normal data and efficient with small to medium sample sizes. Analysis comprised measurement model evaluation, ranging from indicator reliability to composite reliability to both convergent and discriminant validity, and structural path analysis. A bootstrapping method with 5,000 resamples was applied to estimate the statistical significance of direct effects, indirect effects, including mediation by data quality and moderation by top management support and data-driven culture (Becker et al., 2023).

Multi-Group Analysis (MGA) was furthermore conducted to investigate structural relationship differences by firm size, BI maturity, and data silo severity. Firm size was categorized as small (< 50 employees), medium (50-200), and large (> 200). BI maturity varied from early-stage (little use), via partial (department-level adoption) to comprehensive integration (use at organization-wide levels). Data silo severity ranged from low (central systems) and moderate (some fragmentation) to high (considerable fragmentation and manual reconciliation). The step served to measure the variance of BI outcomes across organizational settings, consistent with the TOE framework and digital transformation studies. MGA afforded a more detailed understanding of the way that firms are able to develop a BI strategy to suit their structural and technological arrangements. Together, PLS-SEM and MGA allowed for an effective and adaptive

analytical framework for measuring the multi-dimensional influence of BI operationally (Ngh et al., 2023).

The data for this study are original and unpublished, so the results provide novel contributions to knowledge on BI adoption and BI's influence on an organization in Jordan. The data shall be made available for future use, subject to disclosure of this purpose, and with different research aims.

3. RESULTS

This section addresses the empirical findings obtained from the data collection on surveys among Jordanian insurance companies. The impact of BI integration on significant organizational outcomes like data silo reduction, operational efficiency, regulatory compliance, and decision-

Table 2. Descriptive statistics of study variables

Variable	Mean	Standard Deviation	Minimum	Maximum
BI Integration	3.87	0.72	2.00	5.00
Data Silo Severity (Reversed)	3.21	0.81	1.00	5.00
Operational Efficiency	3.68	0.65	2.00	5.00
Regulatory Compliance	3.74	0.78	1.00	5.00
Decision-Making Effectiveness	3.82	0.69	2.00	5.00
Data Quality	3.91	0.61	2.00	5.00
Top Management Support	3.64	0.88	1.00	5.00
Data-Driven Culture	3.56	0.84	1.00	5.00

Note: n = 260.

Table 3. Measurement model analysis

Construct	Indicator	Loading	CR	AVE	Cronbach's Alpha
BI Integration	BI1	0.812	0.891	0.672	0.844
	BI2	0.853			
	BI3	0.816			
Data Quality	DQ1	0.792	0.876	0.640	0.821
	DQ2	0.821			
	DQ3	0.804			
Operational Efficiency	OE1	0.810	0.884	0.658	0.830
	OE2	0.835			
	OE3	0.801			
Regulatory Compliance	RC1	0.812	0.893	0.676	0.847
	RC2	0.854			
	RC3	0.826			
Decision-Making Effectiveness	DM1	0.824	0.899	0.687	0.856
	DM2	0.861			
	DM3	0.827			
Data-Driven Culture	DC1	0.807	0.882	0.652	0.833
	DC2	0.825			
	DC3	0.801			
Top Management Support	TM1	0.834	0.889	0.667	0.840
	TM2	0.846			
	TM3	0.787			

making effectiveness is investigated in this paper. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the results additionally assess the mediating impact of data quality, top management support, and data-driven culture. Furthermore, a Multi-Group Analysis (MGA) helps identify how contextual factors, including company size, BI maturity, and silo intensity, affect the effectiveness of BI adoption across various organizational profiles.

Table 3 presents the results of the measurement model analysis, demonstrating strong reliability and validity for all constructs included in the study. Using three indicators – all of which showed strong standardized loadings ranging from 0.787 to 0.861 – each construct, including BI Integration, Data Quality, Operational Efficiency, Regulatory Compliance, Decision-Making Effectiveness, Data-Driven Culture, and Top Management Support, was measured. With a range from 0.876 to 0.899, the Composite Reliability (CR) scores for every construct exceeded the advised threshold of 0.70, therefore suggesting a strong degree of internal consistency. Likewise, the average variance extracted (AVE) values are all above 0.64, therefore attesting to sufficient convergent validity (Taqa, 2025). From 0.821 to 0.856, Cronbach's Alpha values proved even more the dependability of the applied scales. These findings, taken together, confirm the mea-

surement model and assist in the usage of these constructs in the phase of structural equation modeling of the research (Cheung et al., 2024).

The findings reported in Table 4 verify the support for all hypotheses, creating an unequivocal relationship between BI integration and different organizational performances across Jordan's insurance industry. In particular, BI integration reduces data silo intensity significantly (*H1*), improves operational efficiency (*H2*), facilitates compliance with regulations (*H3*), and improves the effectiveness of decisions (*H4*) with high values of *t* and highly significant levels of *p*. The mediation effect examined in *H5* shows that better data quality is only one part of the explanation for how BI improves decisions. The moderation effects of *H6* and *H7*, demonstrating the reinforcing influence of data-driven cultures and top management support, respectively, reinforce this conclusion. The results emphasize the dual role played by both technological and managerial elements to make BI systems maximally impactful (Oreqat, 2021).

The mediation analysis in Table 5 shows that BI integration has a strong and direct impact on decision-making effectiveness ($\beta = 0.428$, $t = 8.11$, $p < 0.0002$). When data quality is introduced as a mediator, the indirect effect is also statistically significant ($\beta = 0.216$, $t = 4.86$, $p = 0.0011$). This suggests that part of the influence of BI integra-

Table 4. Hypothesis testing results

Hypothesis	Statement	Effect Size (β)	t-value	p-value	Outcome
<i>H1</i>	BI integration clearly reduces data silos across insurance firms	-0.482	9.321	< 0.0001	Supported
<i>H2</i>	BI integration noticeably boosts operational efficiency	0.413	7.642	0.0003	Supported
<i>H3</i>	BI integration significantly improves regulatory compliance	0.391	7.135	0.0005	Supported
<i>H4</i>	BI integration strengthens decision-making effectiveness	0.428	8.112	< 0.0002	Supported
<i>H5</i>	Data quality helps explain how BI integration leads to better decision-making (mediation effect)	0.216	4.857	0.0012	Supported
<i>H6</i>	A strong data-driven culture makes BI integration even more effective at improving efficiency (moderation effect)	0.183	3.981	0.0026	Supported
<i>H7</i>	When top management is supportive, BI integration has a stronger impact on regulatory compliance (moderation effect)	0.194	4.113	0.0021	Supported

Table 5. Mediation analysis results

Pathway	Direct Effect (β)	Indirect Effect (β)	t-value	p-value	Mediation Type
BI Integration → Decision-Making Effectiveness	0.428	–	8.11	< 0.0002	–
BI Integration → Data Quality → Decision-Making Effectiveness	0.271	0.216	4.86	0.0011	Partial Mediation

Table 6. Moderation analysis results

Interaction Effect	Path Coefficient (β)	t-value	p-value	Moderation Type
BI Integration \times Data-Driven Culture \rightarrow Operational Efficiency	0.183	3.981	< 0.001	Significant Positive
BI Integration \times Top Management Support \rightarrow Regulatory Compliance	0.194	4.113	< 0.001	Significant Positive

tion on decision-making operates through its improvement of data quality. Since the direct effect remains significant even after accounting for the mediation path, the analysis supports partial mediation, indicating that both direct and data-quality-enhanced pathways contribute to better decision-making outcomes (Rijnhart et al., 2021).

Table 6 displays the results of the moderation analysis, exploring how data-driven culture and top management support influence the strength of BI integration effects. The interaction between BI integration and data-driven culture significantly enhanced operational efficiency ($\beta = 0.183, p < 0.001$), indicating that organizations with a stronger culture of data usage experience greater efficiency gains from BI systems. Similarly, the interaction between BI integration and top management support significantly increased regulatory compliance outcomes ($\beta = 0.194, p < 0.001$), emphasizing the importance of leadership involvement in driving BI success (Al-Muntasir, 2022).

These findings confirm that organizational context, particularly culture and leadership, plays a critical role in maximizing the value of BI systems, functioning as key enablers in digital transformation strategies (Igartua & Hayes, 2021).

The MGA results indicate that the performance outcomes of BI adoption vary considerably by firm size, BI maturity level, and degree of data fragmentation, emphasizing the influence of contextual elements on BI success. Firm size continuously impacted performance outcomes: mid-sized companies witnessed significant gains in operational efficiency, while large companies achieved better results across regulatory compliance and decision-making. These patterns suggest that larger companies are best placed to leverage BI because of the large data needs, capabilities, and structural space available to them (Ahmad et al., 2023).

Additionally, crucial was BI maturity. While those who attained complete BI integration reported improved compliance results, those who moved from early-stage adoption to partial integration saw gains in operational performance. Companies moving straight from early-stage to complete integration showed the highest gain in decision-making, therefore highlighting the strategic benefits of broad BI adoption. Surprisingly, data silo degree started to play a significant, though unanticipated role. The more severe the data silos, the more benefits BI yields. Low to mid-level silo severity improved operational efficiency; compliance was raised with mid-level

Table 7. Multi-group analysis (MGA) results

Moderator	Comparison	BI Path	Group 1 Coefficient	Group 2 Coefficient	Difference	t-value	p-value
Firm Size	Small vs Medium	BI \rightarrow Operational Efficiency	0.42	0.53	0.11	2.15	0.032
Firm Size	Medium vs Large	BI \rightarrow Regulatory Compliance	0.45	0.57	0.12	2.40	0.018
Firm Size	Small vs Large	BI \rightarrow Decision-Making Effectiveness	0.47	0.58	0.11	2.30	0.022
BI Maturity Level	Early-stage vs Partial	BI \rightarrow Operational Efficiency	0.38	0.52	0.14	2.75	0.006
BI Maturity Level	Partial vs Full Integration	BI \rightarrow Regulatory Compliance	0.44	0.56	0.12	2.60	0.010
BI Maturity Level	Early-stage vs Full Integration	BI \rightarrow Decision-Making Effectiveness	0.46	0.59	0.13	2.55	0.011
Data Silo Severity	Low vs Moderate	BI \rightarrow Operational Efficiency	0.40	0.54	0.14	2.80	0.005
Data Silo Severity	Moderate vs High	BI \rightarrow Regulatory Compliance	0.43	0.58	0.15	2.95	0.003
Data Silo Severity	Low vs High	BI \rightarrow Decision-Making Effectiveness	0.45	0.60	0.15	2.90	0.004

to high levels of severity; while decision-making showed the most advantages at highly siloed levels, so showcasing BI's ability to manage distinct data sources (Zhou et al., 2024).

4. DISCUSSION

By removing data silos, improving functional efficiency, and therefore promoting regulatory compliance as well as decision-making, this study shows the essential position of Business Intelligence (BI) tools to drive performance at Jordanian insurance businesses. These findings confirm long-standing concerns about how system fragmentation might compromise performance (Jeske & Olson, 2024; Sousa et al., 2024). By means of homogenous data availability and interdepartmental transparency, BI integration, where it aligns with business processes, overcomes constraints. This supports current studies suggesting that data silos result from organizational resistance as well as mismatched incentive structures, rather than only technological causes (Amini et al., 2021; Abu-Al Sondos et al., 2024).

BI's operational efficiency impact is supported by the available literature calling for timely and reliable data to drive corporate activities (Yesodha et al., 2023; Challa et al., 2024). In Jordan's insurance industry with cumbersome, traditional procedures, BI facilitates quicker turnaround times and less redundancy, indicative not only of automation but of enhanced strategic alignment as well.

Improvement of regulatory compliance is another significant consequence. As insurers experience mounting pressure for timely reporting, BI facilitates standardized reporting and audit preparedness (Cornwell et al., 2023). This is highly reinforced where high-level management is actively invested in BI adoption and emphasizes convergence with compliance goals (Hashem & Starr, 2025). In addition, this research shows that data quality is the mediator of BI and decision-making. Proper and timely data are essential to provide accurate insights (Jha et al., 2021; Liu & Lu, 2021). Even with sophisticated BI systems, if there is no authoritative data management, outputs cannot be trusted. Likewise, data-driven culture enhances BI's influence on operational results, supporting past research that suggests that both technological spending and cultural preparedness are equally significant (Tavera Romero et al., 2021).

MGA results also indicate that BI benefits are largest among companies with high initial data fragmentation levels. Those companies with higher BI maturity levels similarly produced better results, implying that integration to the maximum extent possible – rather than partial or symbolic adoption – is essential (Ali Albasheir, 2023; Zhou et al., 2024).

Overall, BI success is less about buying technology than it is about mapping it onto organizational designs, leadership support, and cultural change. In Jordan's changing regulatory context, BI needs to be strategically implemented to secure sustainable performance gains.

CONCLUSION

This study set out to develop an integrated model exploring how BI systems influence data silos, efficiency, compliance, and decision quality in Jordanian insurance firms, moderated by culture and leadership. The empirical analysis brought into sharp relief the fact that integration of BI has significantly decreased the persistence of data silos while at the same time enhancing operational efficiency, regulatory compliance, and fitness across decisions.

The results indicate that BI systems provide maximum benefits to organizations experiencing high data fragmentation, those that are higher in BI maturity, and those with high leadership engagement and cultural preparedness. In addition, the study confirmed that data quality mediates, to some extent, the BI-decision-making relationship, while data-driven culture and support from the top management function as facilitating moderators of performance outcomes.

These results lead to the conclusion that BI is not so much technological as it is an organizational system change that must be committed to at the strategic, cultural, and infrastructural levels. Enterprises that treat BI as an enabler of strategy, as opposed to an obligation to be compliant, stand to gain the maximum benefits from BI.

Future studies can extend this analysis by utilizing longitudinal data to evaluate BI integration results over a period of time, or by analyzing public versus private sector adoption. Further, examining the ethical aspects of algorithmic decisions made by BI systems may better help us understand responsible digital change across regulated sectors.

AUTHOR CONTRIBUTIONS

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