




“Business intelligence usage in the Jordanian banking sector: The role of data literacy, strategic alignment, and change management”

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BUSINESS INTELLIGENCE USAGE IN THE JORDANIAN BANKING SECTOR: THE ROLE OF DATA LITERACY, STRATEGIC ALIGNMENT, AND CHANGE MANAGEMENT

Abstract

Business intelligence and analytics (BIA) have become an essential tool for improving decision-making and maintaining a competitive edge in the global banking industry. Nevertheless, the extent of adoption varies significantly across emerging economies. This study examines the principal organizational and individual determinants influencing BIA utilization in Jordanian commercial banks, focusing on four main predictors: data literacy, change management effectiveness, strategic alignment, and user involvement in system development. A quantitative research design was used, and an online questionnaire was distributed among all twenty commercial banks in Jordan (15 locally owned and 5 foreign) between January and April 2025. The survey was targeted at information technology professionals, operations managers, and data specialists directly involved in the design, implementation, and operationalization of BIA systems. A total of 566 valid responses were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results prove that user involvement in system development (Beta 0.31, P 0.001), data literacy (Beta 0.30, P 0.001), change management effectiveness (Beta 0.27, P 0.001), and strategic alignment (Beta 0.20, P 0.001) have a significant positive effect on BIA usage. Further comparative analysis shows that there are no statistically significant differences between local and foreign banks as to their BIA adoption levels or the strength of the relations among the variables examined. This means both cohorts have become equally digitally ready and BI-integrated. The study highlights the need to blend individual competencies with organizational capabilities to effectively utilize BIA in the Jordanian banking sector and provides recommendations to help executives and policymakers improve data-driven decision-making.

Keywords involvement, alignment, business intelligence, data literacy

JEL Classification G21, L86, O33, C83

INTRODUCTION

The current environment in which an organization operates is highly dynamic due to digital innovation, changing customer expectations, and the growing centrality of data in strategic decision-making. The increased relevance of Business Intelligence and Analytics (BIA) systems that can turn masses of raw data into tangible, actionable knowledge should be regarded as one of the key signs of such a shift. These systems are generally embraced to offer support with a view to increasing organizational competitiveness in unstable financial environments, enabling adherence to regulatory standards, and developing an elevated degree of strategy planning. Commercial banks, especially, have been at the forefront in adopting BIA technologies in a bid to survive the storm and deal with evolving client demands, and also fit within the dynamic regulatory conditions.

The BIA systems have turned out to be a necessity in the fast-changing global world, where banks are now dynamically creating and process-



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ing a lot of data to dynamically obtain operational intelligence. It is generally agreed in the sector that such capabilities are a very crucial element in delivering competitive advantage and value addition to decision-making. However, although the rate of BIA utilization is on the rise, there is still a great proportion of banks that are not utilizing the potential of the same. Data integration problems, lack of analytical skills, organizational resistance, and lack of adequate technological infrastructure remain the challenges that impede the ability to implement it successfully. The listed barriers indicate that effective adoption requires not only technical systems but also the willingness of organizations, effective leadership in support, and effective training of the users. Although these factors have been pointed out in earlier research, little has been emphasized on internal organizational competencies that determine the effective exploitation of BIA. This problem is especially applicable to the emerging economies like Jordan, where the banking industry is in the process of digital transformation but has not yet achieved the strategic value of BIA. The differences in organizational maturity, competence, and preparedness cause obstacles that inhibit the banks from maximizing data-driven decision-making. However, the missing empirical data regarding the effect of organizational factors on the adoption of BIA among Jordanian commercial banks are the key scholarly issue. The importance of filling this gap is crucial to academic development and practical applicability, as it ensures that banks can increase the value of their technological investments and improve their competitiveness.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Data literacy is often discussed as one of the core skills in the contemporary organization that allows workers at any level to interpret, comprehend, and use data in the decision-making process (Fattah, 2024). Under business intelligence and analytics (BIA), data literacy will enable users who identify critical insights on data, identify patterns, and make strategic decisions (Coulthart et al., 2024). It has been demonstrated that BIA systems have been associated with a high level of success among individuals who can understand data outputs and operate with the same (da Silva Cezar & Maçada, 2023). Organizational agility and data-driven culture will be higher when the employees have a high level of data literacy, are more likely to use analytical tools, ask the right questions, and understand dashboards or predictive reports, as required (Pothier & Condon, 2020). Banking data literacy is especially important in the banking business sector due to numerous and complicated financial transactions, customer behavior statistics, and regulatory demands. Kamoun-Chouk (2022) stressed that banks in Jordan that used data literacy of employees experienced a rise in BIA effectiveness, a more accurate customer segmentation, and a risk management procedure was established. In the same vein, Ndukwe and Daniel

(2020) established that when the bank employees can read and interpret the data easily, the process is streamlined, and the incorporation and utilization of the business intelligence systems become more productive. Having said that, notwithstanding these established positive outcomes, there are still numerous challenges faced by organizations in regard to significant disparities in data literacy across their staffing base, thus forming an obstacle to the successful utilization of BIA tools (Coners et al., 2025; Mohammad et al., 2025). Thus, the need to build a data-literate workforce is both a technical requirement and a strategic decision of banks that want to gain the greatest benefit under their analytics investments (Tockner & Zehetner, 2024).

BIA systems may be a big change within an organization and not just a technical change, but also entail process change, cultural change, and even behavioral change that is required of the employees (Saputra et al., 2024). Thus, following change management is a vital element in realizing the success of BIA system implementation and its long-term usage (Kiu & Chan, 2024). Change management effectiveness is the ability of an organization to plan, communicate, and manage the process of leaving old systems and processes to adopt new technologies in a manner that will reduce resistance and maximize user participation (Widjaja et al., 2025; Alabda et al., 2025). It has already been highlighted that the presence of strong change management practices in an organization

may lead to a higher success rate in the initiatives related to the area of technology adoption, which also includes projects related to analytics platforms as well (Ramalingam et al., 2024). A poor change handling process has been proven to cause employee resistance, stagnant systems, and lost investment on the whole within the banking institutions where regulation and customer demands require them to be responsive. On the other hand, successful change management ensures a higher degree of compatibility with technology and usage requirements, which boosts the success of BIA (Ghazanfari et al., 2011). The study by Prastiwi and Tukiran (2024) established that institutions engaging users in the change process and providing proper communication and education were more successful in integrating analytics solutions related to change readiness and BIA adoption in Jordanian banks. On the same note, Mahamoud Hasan et al. (2025) determined that one of the major obstacles to the use of analytics in Jordan's banking sector was resistance to change. An effective change management, therefore, increases organizational flexibility, creates an organizational culture of innovation, and promotes staff involvement in analytics-based decision-making (Ahsan, 2025). It also assists in synchronizing technical goals with human dynamics, especially when operating in a highly critical environment, such as banking, where precision and versatility of both are a necessity.

Strategic alignment describes how effective or integrated the information systems of an organization, such as business intelligence and analytics (BIA), or the business intelligence and analytics, are to the operations priorities, business goals, and strategic objectives of a given organization (Widjaja et al., 2025). Strategic alignment in the context of using BIAs will mean that the analytics tools do not exist as separate entities and that they are rather carefully integrated into decision-making initiatives aligned with the long-term vision of the organization and indicators of its performance. As long as BIA systems have been strategically set, banks tend to invest in pertinent data infrastructure, enhance data-driven culture, and enable departments to make smart decisions based on real-time insights (Phan & Teoh, 2024). This correspondence allows giving priority to analytical projects to ensure value creation, better customer satisfaction, and increased

regulatory compliance, which are vital tasks in a highly competitive and stringently regulated environment of the banking industry (Hyun et al., 2023). According to Gokalkpet al. (2023), strategic alignment between IT and business departments increased the utility of business intelligence to a large extent in Jordanian banks. The research study demonstrated that those banks that incorporated the BIA tools into the process of strategic planning and performance management enjoyed better engagement among staff members, increased vision in forecasting, and greater efficiency in implementing the operation to the highest level. In the same line, von Ritter et al. (2025) stated that a proper fit between analytics programs and company strategies translates to greater use of data assets and greater return on the investment in analytics technology. The problem is that, in the absence of strategic alignment, BIA initiatives can be characterized by the confusion of objectives, entropy of implementation, or a lack of support on the part of senior leaders (Isiaku & Adalier, 2025; Alashqar et al., 2025; Abu-ALSondos et al., 2024). Such a gap usually leads to systems remaining underused or serving mischievous ends at the expense of any possible utility.

User involvement in developing systems refers to the extent of participation by end-users in the design of information systems, including business intelligence and analytics (BIA), throughout the development phases, testing, and implementation of a system (Tsiu et al., 2025). This participation is considered crucial for achieving systems that meet users' functional needs, provide acceptable ease of adoption, and ensure the relevance of outputs for effective decision-making. User involvement in the BIA context can make banks customize the analytical tools so that they fit the needs of the departments, such as risk, credit, operations, and marketing (Kaur, 2024). The result of such collaboration is better system usability, trust in the results of analytics work, and an advance in the perceived value of the technology (Srivastava et al., 2022). Besides, the engaged users have high chances to gain a sense of ownership, thus limiting resistance to change and long-term use of the system. Several researchers have renewed the positive impact of user involvement on the success of systems. According to Ragazou et al. (2023), banks in Jordan that involved their staff in developing and customizing BIA tools reported a smoother im-

plementation process and greater user satisfaction. Likewise, Alsibhawi et al. (2023) discovered that the involvement of users in the initial phases of system development increased the usefulness and actual system utilization of the BIA systems in banking contexts. Inclusion of users will also help identify business issues that can be addressed using analytics and establish that data visualization and dashboards are actionable and easy to understand. In this regard, user participation is more than just a technical requirement; it is also a strategic means of enabling the data-based decision-making of contemporary banking institutions.

Altogether, the analyzed literature highlights the primary importance of organizational and managerial capabilities in determining the success of BIA adoption in the banking industry. The importance of data literacy, effective change management, strategic alignment, and user involvement is proven by evidence gathered in other areas; however, there is a lack of empirical studies related to the situation in Jordan. In turn, the lack of a combined study of the impact of these four factors on BIA utilization is a unique research gap.

To fill this gap, the current research examines the most important factors that determine the use of business intelligence and analytics in Jordanian commercial banks, specifically, data literacy, effectiveness of change management, strategic alignment, and user participation in the system development. Based on this premise, the following hypotheses can be formulated:

- H1: Data literacy positively affects the usage of business intelligence and analytics in Jordanian commercial banks.*
- H2: Change management effectiveness positively affects the usage of business intelligence and analytics in Jordanian commercial banks.*
- H3: Strategic alignment positively affects the usage of business intelligence and analytics in Jordanian commercial banks.*
- H4: User involvement in system development positively affects the usage of business intelligence and analytics in Jordanian commercial banks.*

2. RESEARCH METHODOLOGY

The current study followed a quantitative research design using a cross-sectional survey to test the hypotheses. A structured questionnaire was sent to all twenty commercial banks in Jordan, fifteen of which were Jordanian and five foreign, thus making sure that the sector was well covered. The study was done in the period between January and April 2025. Due to limitations of non-census sampling and the inability to reach all target employees, a purposive convenience method was used, which allowed the researchers to obtain the appropriate responses from informed participants (Sekaran, 2016). The sample was selected purposely and covered IT professionals, operations managers, data specialists, and middle- to senior-level employees because these people are directly involved in designing, implementing, and using Business Intelligence and Analytics (BIA) systems. Their expertise-based responses are on practice and not perception, thus increasing the internal validity of the study. A total of 566 valid responses were obtained. The survey tool consisted of twenty-six items that were grouped into five parts. The former section included five demographic items, and the rest of the twenty-one items were used to measure the constructs of the study: data literacy, change management effectiveness, strategic alignment, and user involvement in system development (eighteen items), and three items were used to measure the use of BIA. The measurement was done with the five-point Likert scale. To maintain clarity and content validity, the questionnaire was pre-tested on 25 respondents, and a pilot test was done using 30 respondents. The pre-test and pilot outcomes were reviewed, and some adjustments to language and design were made before the actual administration. The analysis was performed with the help of the Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable in the case of exploratory models, small to medium sample sizes, and non-normally distributed data (Hair et al., 2014). The SmartPLS version 4.0.7.8 was used to conduct the analyses as the software platform is highly appropriate to model-based prediction and hypothesis testing (Mahmoud et al., 2024; Sharabati et al., 2024; Alrifae, 2025; Alzubi et al., 2021). The analysis was done in two phases. To determine construct reliability and validity, the measurement model was

evaluated at the first stage. Cronbach’s alpha and Composite Reliability (CR) were used to determine internal consistency reliability, and Average Variance Extracted (AVE) was used to determine convergent validity (Ibrahim & Alzubi, 2024). The Fornell-Larcker criterion and cross-loadings were used to confirm discriminant validity. The Standardized Root Mean Square Residual (SRMR) was used to assess the model fit. Second, the structural model was subjected to testing to test the hypothesized relationships using path coefficients, bootstrapping techniques to test significance, explained variance (R^2), effect sizes (f^2), and predictive relevance (Q^2).

3. RESEARCH RESULTS

In response to the reviewer’s request, further analyses were performed to compare the usage of BIA between local and foreign banks operating in Jordan. The entire sample was separated into two

groups, and independent-sample t-test procedures were run to determine if there were significant differences between groups with regard to the key constructs. The results in Table 4 indicated that there were no statistically significant differences between local and foreign banks in terms of data literacy, change management effectiveness, strategic alignment, involvement of users in system development, or the overall usage of BIA (all $p > 0.05$). These results indicate that the adoption of the BIA tools has been similar at both local and foreign banks. This is aligned and potentially sector-wide compliance with the regulatory and digital transformation requirements set by the Central Bank of Jordan. To further validate these findings, a multi-group analysis (MGA) using PLS-SEM was carried out. MGA results showed that all the structural path coefficients were not significantly different from the average of the two groups ($p > 0.05$). This implies that the relationship between the four predictors and BIA usage was structurally invariant, which shows that the determinants of

Table 1. Convergent validity results

Construct	Cronbach’s Alpha	Composite Reliability	Average Variance Extracted (AVE)
Business Intelligence Usage	0.885	0.931	0.820
Data Literacy	0.873	0.915	0.783
Change Management Effectiveness	0.861	0.909	0.768
Strategic Alignment	0.847	0.901	0.757
User Involvement in System Dev.	0.892	0.927	0.810

Table 2. Heterotrait-Monotrait (HTMT) ratio

Variables	1	2	3	4	5
1. Business Intelligence Usage	–	–	–	–	–
2. Data Literacy	0.672	–	–	–	–
3. Change Management Effectiveness	0.654	0.704	–	–	–
4. Strategic Alignment	0.689	0.662	0.718	–	–
5. User Involvement in System Dev.	0.701	0.698	0.672	0.709	–

Table 3. Model fit indicators

Indicator	Saturated Model	Estimated Model
SRMR	0.034	0.036
NFI	0.927	0.925

Table 4. Hypothesis testing results

Hypothesis	Path	Coefficient (β)	t-value	p-value	Decision
H1	Data Literacy → BIA Usage	0.298	5.432	0.000	Accepted
H2	Change Management Effectiveness → BIA Usage	0.274	4.886	0.000	Accepted
H3	Strategic Alignment → BIA Usage	0.201	3.921	0.000	Accepted
H4	User Involvement in System Dev. → BIA Usage	0.309	6.017	0.000	Accepted

BIA usage work in a similar way in local and foreign banks. Overall, the findings support the generalizability of the findings that ownership structure (local vs. foreign) does not materially affect the mechanisms by which data literacy, organizational alignment, change management, or user involvement contribute to BIA usage. The similarity between the two groups highlights the maturity and digital preparedness of the Jordanian banking sector.

4. DISCUSSION

The corresponding study was the analysis of research on organizational and management factors influencing the adoption of Business Intelligence and Analytics (BIA) in Jordanian commercial banks, and four predictors of data literacy, change management effectiveness, strategic orientation, and user engagement in system development have been discussed. The hypothesis that the four variables exert a positive and significant impact on the use of BIA was confirmed by the results of PLS-SEM, which allowed accepting all the *H1-H4*.

The hypothesis *H1* was that data literacy would positively influence the use of the BIA. This was confirmed ($\beta = 0.298$, $t = 5.432$, $p < 0.001$), indicating that the skill of analyzing and using data by employees is one of the primary successes that allows adopting analytics. This result is also similar to that of Mader et al. (2023) and Nazarian-Jashnabadi et al. (2024), who insisted that the more data-literate organizations tend to be, the more integrated the process of integrating analytics into the decision-making process. In a similar vein, da Silva Cezar and Maçada (2023) have found that the agility and responsiveness of organizations are improved by proficient users. With the organizational and external environments in the banking sector of Jordan, where an admirable degree of data accuracy is needed, and the literacy levels are not high enough would lead to the risks of sabotaging the BIA investments.

The second hypothesis (*H2*) was tested and proved the effectiveness of change management, which was also significant ($\beta = 0.274$, $t = 4.886$, $p < 0.001$). Prastiwi and Tukiran (2024) and Kiu and Chan (2024) also observe that in highly established

change practices, resistance reduces and transforms into digital transformation preparedness. The situational impediments and cultural barriers typically make technology usage in Jordan slow (Mahamoud Hasan et al., 2025). Effective communication, as end-user participation and training, therefore renders it indivisible in teaching BIA in daily activities. It goes along with the larger view of Ahsan (2025), who presents the thesis of how appropriate change management develops an innovation-entrenched culture that is pivotal in the competitiveness of the banking industry.

The third hypothesis (*H3*) concerned the relationship between strategic alignment and BIA usage. The findings ($\beta = 0.201$, $t = 3.921$, $p = 0.001$) supported its significance, so it was within the scope of the study by Trincanato and Vagnoni (2024) and Hyun et al. (2023), who also emphasized that it is crucial to align the analytics initiatives with the organizational interests to make them more viable and sustainable. There is a high possibility that BIA is left idled by misalignment in the procurement of Jordanian banks that adopt cost-effective approaches, compliance, and customer-oriented strategies. Gokalket et al. (2023) also stated that failure to create value on BI tools by the bank occurred when it was not explicitly aligned, thus becoming fragmented or symbolic.

Finally, the fourth hypothesis (*H4*) presupposes that user participation in system development will result in an overly good impact. It took place as the most influential ($\beta = 0.309$, $t = 6.017$, $p = 0.001$). The given result can be aligned with the studies by Ragazou et al. (2023) and Alsibhawi et al. (2023), which discuss the role of early user engagement as an addition to usability, relevance, and satisfaction. Using the example of the Jordanian scenario, besides the sense of ownership, the involvement of employees in the development of the BI system of the organization serves to the fact that the outputs of the BI system, i.e., dashboards and predictive reports, reflect the reality of the work of the various departments.

Overall, these findings signify that the concept of a multidimensional approach to BIA is more suitable for comprehending the adoption of this tool. A complex of technical skills (data literacy), organizational operations (change management and strategic alignment), and people-oriented prac-

tices (user involvement) determines the success of implementation. The results extend studies conducted by previous researchers as they verify that dynamics exist within the most under-researched micro of Middle Eastern banking, whereby currently there is very limited literature on BIA adoption. This is where this study would be of value hypothetically, that the organizational and indi-

vidual determinants have been brought together in a single notion of predictability. Practically, it provides bank executives with nervous concepts of how banks can augment competencies and staff causes, and entrench transformation, mix BI and strategy, and give active partake to system users in systems development in the name of achieving the greatest advantage on analytics investment.

CONCLUSION

The research paper established the organizational and managerial factors that affect the adoption of Business Intelligence and Analytics (BIA) in commercial banks in Jordan, specifically, the level of data literacy, change implementation success, strategic orientation, and user involvement in the system development process. The hypothesis that all these four dimensions have a strong and beneficial impact on the BIA utilization is supported by empirical evidence, which contributes to the importance of the multidimensionality of the framework, on which successful adoption is based. Moreover, the findings show that the increased data literacy enables employees to implement analytical skills, which, in turn, improve operational performance and advance data-driven decision-making. Reduced resistance is a prerequisite for being ready, and clinical ingraining of BIA tools in organizational processes is reduced; successful change management is thus placed on a track to deliver the desired outcomes. Strategic alignment ensures that analytical initiatives align with the overall objectives of an organization and, hence, contribute to long-term sustainability. Simultaneously, user involvement in system development increases customization and usability as well as the long-term relevance and interactive sustainability of solutions. This synthesis, by extension, provides a solid theoretical framework to ease the understanding and optimize the adoption of BIA in the banking sector.

The study has several practical recommendations. Prioritizing the development of a data-resilient workforce is imperative; the study recommends that banks undertake continuous training and professional development programs to achieve the same objective. Open communication and stakeholder involvement in the change process are also other ways to reinforce change management practices. It is important to emphasize that BIA initiatives must be linked to organizational strategies to maximize relevance and value creation. Moreover, actively engaging key actors in system design and customization may be institutionalized to increase the relevance and acceptability of the system to users.

Notwithstanding these findings, the study has some limitations. Its narrow focus on Jordanian commercial banks limits the extent of transferring the results to other industries or regions. In addition, the cross-sectional nature of the survey data precludes examination of longitudinal dynamics that are associated with BIA adoption. Subsequent research should include mixed-methods or qualitative methods to cover a wider range of financial and non-financial industries, which would provide a more detailed picture of organizational practices and cultural implications. Finally, the inclusion of additional variables in the model, for example, organizational culture, top management support, or IT readiness, may provide a more exhaustive insight into the mechanisms that govern the adoption and utilization of BIA.

AUTHOR CONTRIBUTIONS

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REFERENCES

1. Abu-AlSondos, I. A., Shehadeh, M., Ajouz, M., Alkhwalidi, A. F., Abdeldayem, M., & Aldulaimi, S. (2024). The role of digital transformation in business: Opportunities, challenges and future directions. *2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETISIS)* (pp. 361-365). <https://doi.org/10.1109/ICETISIS61505.2024.10459639>
2. Ahsan, M. J. (2025). Cultivating a culture of learning: The role of leadership in fostering lifelong development. *The Learning Organization*, 32(2), 282-306. <https://doi.org/10.1108/TLO-03-2024-0099>
3. Alabda, H. E., Alkhamis, F. A., Al-Ayed, S. I., Althuwaini, S., Alayed, T., Hilal, S. I. K. A., Alrifae, A. A. M., Vasudevan, A., & Mohammad, S. I. (2025). Impact of Open Innovation on Sustainability of Islamic Banks in Jordan. In Al-Sartawi, A., Ghura, H. (Eds.), *Artificial Intelligence, Sustainable Technologies, and Business Innovation: Opportunities and Challenges of Digital Transformation* (pp. 1-15). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-77925-1_1
4. Alashqar, M. M., Abulehia, A. F., Atieh, A. A., Mahmoud, M. M. H., & Alzubi, M. M. S. (2025, February). Legal Framework for Regulating AI in Smart Cities: Privacy, Surveillance, and Ethics. In *2025 International Conference for Artificial Intelligence, Applications, Innovation and Ethics (AI2E)* (pp. 1-6). IEEE. <https://doi.org/10.1109/AI2E64943.2025.10983107>
5. Alrifae, A. A. M. (2025). Enhancing employee engagement through HRM practices: A study of the education sector in Jordan. *Problems and Perspectives in Management*, 23(3), 372. [https://doi.org/10.21511/ppm.23\(3\).2025.27](https://doi.org/10.21511/ppm.23(3).2025.27)
6. Alsibhawi, I. A. A., Yahaya, J. B., & Mohamed, H. B. (2023). Business intelligence adoption for small and medium enterprises: Conceptual framework. *Applied Sciences*, 13(7), 4121. <https://doi.org/10.3390/app13074121>
7. Alzubi, M. M., Ismael, B., & Ateik, A. H. (2021, June). The moderating effect of compatibility factor in the usage of e-government services among Malaysian citizens. In *2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE)* (pp. 224-232). IEEE. <https://doi.org/10.1109/ICSCEE50312.2021.9498076>
8. Coners, A., Matthies, B., Vollenberg, C., & Koch, J. (2025). Data skills for everyone!? An approach to assessing the integration of data literacy and data science competencies in higher education. *Journal of Statistics and Data Science Education*, 33(1), 90-115. <https://doi.org/10.1080/26939169.2024.2334408>
9. Coulthart, S., Hossain, M. S., Sumrall, J., Kampe, C., & Vogel, K. M. (2024). Data-science literacy for future security and intelligence professionals. In Ramsay, J. D., & Bennett, N. (Eds.), *Strategic Minds* (pp. 40-60). Routledge. <https://doi.org/10.4324/9781003518488-4>
10. da Silva Cezar, B. G., & Maçada, A. C. G. (2023). Cognitive overload, anxiety, cognitive fatigue, avoidance behavior and data literacy in big data environments. *Information Processing & Management*, 60(6), 103482. <https://doi.org/10.1016/j.ipm.2023.103482>
11. Fattah, I. A. (2024). Decision-making performance of business analytics capabilities: The role of big data literacy and analytics competency. *Business Process Management Journal*, 30(6), 2096-2126. <https://doi.org/10.1108/BPMJ-11-2023-0894>
12. Ghazanfari, M., Jafari, M., & Rouhani, S. (2011). A tool to evaluate the business intelligence of enterprise systems. *Scientia Iranica*, 18(6), 1579-1590. <https://doi.org/10.1016/j.scient.2011.11.011>
13. Gökalp, M. O., Gökalp, E., Gökalp, S., & Koçyiğit, A. (2023). The development of data analytics maturity assessment framework: DAMAF. *Journal of Software: Evolution and Process*, 35(8), e2415. <https://doi.org/10.1002/smr.2415>
14. Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
15. Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106-121. <https://doi.org/10.1108/EBR-10-2013-0128>

16. Hyun, Y., Park, J., Kamioka, T., & Chang, Y. (2023). Organizational agility enabled by big data analytics: Information systems capabilities view. *Journal of Enterprise Information Management*, 36(4), 1032-1055. <https://doi.org/10.1108/JEIM-03-2022-0077>
17. Ibrahim, I., & Alzubi, M. M. S. (2024). The impact of green human resource management practices on turnover intention: Moderated by work-health balance and work-family balance. *Journal of Ecohumanism*, 3(7), 2618-2634. <https://doi.org/10.62754/joe.v3i7.4405>
18. Isiaku, L., & Adalier, A. (2025). Investigating the determinants of continuous use intention of business intelligence systems in Nigerian banks: The role of regulatory support. *Management Decision*. Advance online publication. <https://doi.org/10.1108/MD-08-2024-1848>
19. Kamoun-Chouk, S. (2022). How digital literacy could impact environmental scanning, business intelligence, and knowledge management? In Uden, L., Ting, I. H., & Feldmann, B. (Eds.), *Knowledge Management in Organisations. KMO 2022. Communications in Computer and Information Science* (vol. 1593, pp. 91-102). Cham: Springer. https://doi.org/10.1007/978-3-031-07920-7_8
20. Kaur, H. (2024). Elucidating the moderating role of CRM in business intelligence and organisational performance. In *Finance analytics in business: Perspectives on enhancing efficiency and accuracy* (pp. 235-249). Emerald Publishing. <https://doi.org/10.1108/978-1-83753-572-920241012>
21. Kiu, C. T. T., & Chan, J. H. (2024). Firm characteristics and the adoption of data analytics in performance management: A critical analysis of EU enterprises. *Industrial Management & Data Systems*, 124(2), 820-858. <https://doi.org/10.1108/IMDS-07-2023-0430>
22. Mader, G., Ghinelli, F., Torelli, F., Patel, C., Masseria, C., Dickerson, J., Nguyen, D., & Cantor, L. (2023). The budget impact of introducing the OMNI® surgical system to a United States health plan for managing mild-to-moderate primary open-angle glaucoma. *Expert Review of Pharmacoeconomics & Outcomes Research*, 23(7), 805-812. <https://doi.org/10.1080/14737167.2023.2217357>
23. Mahamoud Hasan, M., Aparisi-Torrijo, S., & González-Ladrón-de-Guevara, F. (2025). Change management and organizational performance: Current key trends. *Cogent Business & Management*, 12(1), 2478447. <https://doi.org/10.1080/23311975.2025.2478447>
24. Mahmoud, M. M. H., Ali, A. A., Alrifae, A. A., Eitah, R. A., & AlZubi, M. M. (2025). The impact of digital HRM system and digital transformation on HR efficiency with organizational agility as a moderator. *Discover Sustainability*, 6(1), 1038. <https://doi.org/10.1007/s43621-025-01713-9>
25. Mohammad, A. A. S., Vasudevan, A., Al-Momani, A. A. M., Alrifae, A. A. M., Jahmani, K., Mohammad, S. I., Kutieshat, R. J., Faraj Aldaihani, F. M., & Arar, T. E. (2025). Cloud Computing Adoption in the Digital Era: A Bibliometric Analysis and Research Agenda. *Artificial Intelligence, Sustainable Technologies, and Business Innovation: Opportunities and Challenges of Digital Transformation* (pp. 137-148). https://doi.org/10.1007/978-3-031-77925-1_13
26. Nazarian-Jashnabadi, J., Haseli, G., & Tomaskova, H. (2024). Digital transformation for the sustainable development of business intelligence goals. In *Decision support systems for sustainable computing* (pp. 169-186). Elsevier. <https://doi.org/10.1016/B978-0-443-23597-9.00008-1>
27. Ndukwe, I. G., & Daniel, B. K. (2020). Teaching analytics: Value and tools for teacher data literacy – A systematic and tripartite approach. *International Journal of Educational Technology in Higher Education*, 17, 1-31. <https://doi.org/10.1186/s41239-020-00201-6>
28. Phan, K. Y., & Teoh, A. P. (2024). Systematic literature review on the influence of business intelligence capabilities on BI systems success and firm performance: An Asian perspective. *International Journal of Business Information Systems*, 47(2), 227-254. <https://doi.org/10.1504/IJBIS.2024.142289>
29. Pothier, W. G., & Condon, P. B. (2020). Towards data literacy competencies: Business students, workforce needs, and the role of the librarian. *Journal of Business & Finance Librarianship*, 25(3-4), 123-146. <https://doi.org/10.1080/8963568.2019.1680189>
30. Prastiwi, I. B., & Tukiran, M. (2024). Navigating AACSB accreditation with strategic leadership and change management: A systematic literature review. *Quality Assurance in Education*, 32(3), 340-355. <https://doi.org/10.1108/QAE-12-2023-0214>
31. Ragazou, K., Passas, I., Garefalakis, A., & Zopounidis, C. (2023). Business intelligence model empowering SMEs to make better decisions and enhance their competitive advantage. *Discover Analytics*, 1(1), 2. <https://doi.org/10.1007/s44257-022-00002-3>
32. Ramalingam, S., Subramanian, M., Reddy, A. S., Tarakaramu, N., Khan, M. I., Abdullaev, S., & Dhahbi, S. (2024). Exploring business intelligence applications in the healthcare industry: A comprehensive analysis. *Egyptian Informatics Journal*, 25, 100438. <https://doi.org/10.1016/j.eij.2024.100438>
33. Saputra, N., Putera, R. E., Zetra, A., Azwar, Valentina, T. R., & Muilia, R. A. (2024). Capacity building for organizational performance: A systematic review, conceptual framework, and future research directions. *Cogent Business & Management*, 11(1), 2434966. <https://doi.org/10.1080/23311975.2024.2434966>
34. Sekaran, U. (2016). *Research methods for business: A skill-building approach*. John Wiley & Sons.
35. Sharabati, A.-A. A., Ali, A. A. A., Allahham, M. I., Hussein, A. A., Alheet, A. F., & Mohammad, A. S. (2024). The impact of digital marketing on the performance

- of SMEs: An analytical study in light of modern digital transformations. *Sustainability*, 16(19), 8667. <https://doi.org/10.3390/su16198667>
36. Srivastava, G., Muneeswari, S., Venkataraman, R., Kavitha, V., & Parthiban, N. (2022). A review of the state of the art in business intelligence software. *Enterprise Information Systems*, 16(1), 1-28. <https://doi.org/10.1080/17517575.2021.1872107>
 37. Tockner, R., & Zehetner, A. (2024). Teaching data literacy: Bridging business demands and curriculum essentials in dynamic learning environments. *International Conference on Interactive Collaborative Learning* (pp. 445-456). https://doi.org/10.1007/978-3-031-83523-0_41
 38. Trincanato, E., & Vagnoni, E. (2024). Business intelligence and the leverage of information in healthcare organizations from a managerial perspective: A systematic literature review and research agenda. *Journal of Health Organization and Management*, 38(3), 305-330. <https://doi.org/10.1108/JHOM-02-2023-0039>
 39. Tsiu, S. V., Ngoben, M., Mathabela, L., & Thango, B. (2025). Applications and competitive advantages of data mining and business intelligence in SMEs performance: A systematic review. *Businesses*, 5(2), 22. <https://doi.org/10.3390/businesses5020022>
 40. Von Ritter, C., Kanbach, D. K., Maran, T. K., Kraus, S., & Dabic, M. (2025). Navigating long-term orientation, adaptability and crisis response: A strategic view on family business resilience. *International Journal of Entrepreneurial Behavior & Research*, 31(11), 194-213. <https://doi.org/10.1108/IJEER-12-2024-1451>
 41. Widjaja, A. A., Ghapanchi, A. H., & Bingley, S. (2025). Uncovering the antecedents to the effective use of business intelligence: Lessons from a qualitative systematic review approach. *Journal of Enterprise Information Management*, 38(3), 768-797. <https://doi.org/10.1108/JEIM-08-2024-0440>

APPENDIX A

Table A1. Banks operating in Jordan

No.	Bank Name
1	Arab Bank
2	Bank of Jordan
3	Cairo Amman Bank
4	Capital Bank of Jordan
5	Housing Bank for Trade & Finance (HBTF)
6	Jordan Ahli Bank
7	Jordan Commercial Bank
8	Jordan Kuwait Bank
9	Arab Jordan Investment Bank (AJIB)
10	INVESTBANK
11	Bank al-Etihad
12	Arab Banking Corporation – Jordan (ABC)
13	Islamic International Arab Bank
14	Jordan Islamic Bank
15	Safwa Islamic Bank

Table A2. Foreign banks operating in Jordan

No.	Bank Name
1	National Bank of Kuwait (NBK)
2	Egyptian Arab Land Bank
3	Rafidain Bank
4	Bank Audi Jordan
5	Al-Rajhi Bank Jordan