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Advanced insights into the business world: Exploring the interplay of business intelligence, knowledge management practices, and sustainability performance

Anas Hakeem [1,*], Emran Hakeem [2], Mohammed Hakeem [2], Abdullah Alfarah [3,4]

[1]College of Business and Economics, Umm Al-Qura University, Makkah, Saudi Arabia
[2]College of Business, Effat University, Jeddah, Saudi Arabia
[3]College of Administrative and Financial Science, Saudi Electronic University, Riyadh, Saudi Arabia
[4]College of Business, Colorado State University Global, Denver, USA

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ABSTRACT

This study examines the relationship between Knowledge Management Practices (KMP) and Sustainability Performance (SP) in organizations, emphasizing the mediating role of Business Intelligence (BI). Using data from 298 companies in Saudi Arabia's tourism sector, the findings indicate that effective KMP positively impact SP. Furthermore, the results show that KMP contributes to the development of BI, which further enhances sustainability outcomes. This research provides insights into the relatively understudied link between Knowledge Management, Business Intelligence, and Sustainability Performance, offering practical implications for improving organizational strategies in these areas. The study presents scientific evidence from the perspective of tourism companies in Saudi Arabia.

1. Introduction

The importance of knowledge for the global economy has become increasingly acknowledged in recent decades, identifying it as a key factor for economic growth and a main driver of innovation (Brandão et al., 2020). In the tourism sector, knowledge is particularly valuable due to the industry's growing focus on providing innovative, high-quality services that go beyond tourist expectations (Ogutu et al., 2023). In this competitive landscape, knowledge serves as the main source for sustainable competitive advantages. To reach this challenging goal, skilled organizations that can effectively manage the generation, use, and share knowledge for the creation and innovation of new products and services are a necessity, ultimately improving their competitiveness within the sector (Brahami et al., 2020).

In this context, Business Intelligence (BI) technologies demonstrate the ability to manage both structured and unstructured data in large quantities, contributing to the identification, development, or creation of new strategic opportunities for sustainable decision-making (Niu et al., 2021). The evolution of BI involves specialized tools that extract, transform, and load heterogeneous data from different sources into a centralized data warehouse. These tools are skilled at organizing, visualizing, and descriptively analyzing data, using techniques like online analytical processing, balanced scorecard, and data/text mining. For tourism organizations, BI serves as a vital solution to address challenges and effectively manage sustainability information within a sector that increasingly values sustainable practices.

Amidst global environmental concerns, tourism organizations are increasingly recognizing the need to integrate sustainability into their operations. This involves simultaneous attention to social, environmental, and economic objectives. However, there is a surprising scarcity of empirical academic research investigating the dynamic relationship between Knowledge Management Practices (KMP) and BI systems, and their collective impact on enhancing Sustainability Performance (SP) across economic, social, and environmental dimensions, especially within Saudi Arabia's tourism sector (Menaouer et al., 2022). This study focuses on bridging this gap by examining how KMP and BI can collectively drive sustainable growth within the unique framework of Vision 2030. Saudi Arabia's tourism sector extends beyond its economic impact,

* Corresponding Author.
Email Address: aohakeem@uqu.edu.sa (A. Hakeem)
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Corresponding author's ORCID profile:
https://orcid.org/0000-0002-8474-1257

encompassing social, cultural, and environmental dimensions as well. In alignment with Saudi Vision 2030-the government's strategic reform program aimed at boosting economic growth through sustainable tourism-Saudi Arabia has become the world's second-fastest-growing tourism destination. In the first quarter of 2023, international tourism to the Kingdom surged by 64%, surpassing pre-pandemic levels and attracting approximately 7.8 million tourists. In 2022, Saudi Arabia moved to the 13th position globally among the most visited destinations by international tourists, a substantial improvement from the 25th place in 2019, as per the World Tourism Organization Index. The data also reveals that the Kingdom welcomed 16.6 million international tourists in 2022 for various travel purposes. Regarding the international tourism revenue index, Saudi Arabia advanced to the 11th position in 2022, representing a significant improvement from the 27th place recorded in 2019. This growth trajectory underscores the importance of research that can support sustainable tourism management within the Kingdom.

To bridge this gap, this study explores the integrated role of KMP and BI in enhancing SP within Saudi Arabia's tourism sector. By situating this exploration within the context of the unique framework of Vision 2030, the study not only fills a critical gap in academic literature but also highlights how the distinct strategic objectives of Saudi Arabia provide unique insights into tourism development. These findings offer valuable contributions to the field and present a model that may be adaptable to other regions with similar aspirations for knowledge-driven, sustainable growth.

Previous research has portrayed Knowledge Management (KM) as a systematic process involving the collection, organization, and dissemination of accumulated knowledge over time, with the goal of strengthening and preserving a company's competitive advantage (Kianto et al., 2016). This process is especially crucial in the tourism sector, where leveraging knowledge effectively can directly contribute to service innovation and competitive advantage (Ogutu et al., 2023). Described as a cyclical process by Ajmal et al. (2010), Knowledge Management encompasses various activities, techniques, and practices facilitating the capture, creation, storage, distribution, and sharing of both tacit and explicit knowledge. Jennex (2012) further characterized Knowledge Management as the application of knowledge derived from past decision-making experiences to shape current and future decision-making activities, explicitly aimed at enhancing organizational effectiveness. Moreover, Ermine et al. (2006) suggested that Knowledge Management can be perceived as technologies and practices embedded in an information infrastructure, supporting the creation, sharing, and leveraging of intellectual assets within an organization. Additionally, Muchran (2020) argued that Knowledge Management is a vital activity that contributes value and aligns with an organization's strategic plans, ultimately leading to overall organizational strategic benefits and profitability. In tourism, particularly within the unique cultural and economic context of Saudi Arabia, Knowledge Management plays a critical role in achieving Vision 2030's sustainability goals by fostering knowledge-sharing practices tailored to regional needs.

The dynamic and robust nature of tacit/explicit Knowledge Management positions it as a primary source of development for any organization. Furthermore, decision-makers have acknowledged the significance of knowledge resources as a key asset, and now attribute higher value to them than material resources. Prior research, as evidenced by studies conducted by Dimitrios et al. (2018) and Lopes and Farinha (2020), underscores the significance of Knowledge Management as a valuable instrument for augmenting the performance of tourist organizations. In a specific examination within the Thai tourism industry, Ritsri and Meeprom (2020) delved into the impact of KMP on enhancing employee performance. Their findings indicated that the implementation of KMP notably elevated the quality of employee performance in tasks such as financial statement preparation. Consequently, this improvement contributed to heightened satisfaction among users of financial statements and the cultivation of a positive image and reputation for the organizations. These findings suggest that KMP can significantly influence sustainability outcomes in tourism, a relationship this study explores in the Saudi Arabian context. In addition, Jia et al. (2012) suggested an innovative approach wherein tourist organizations could harness artificial intelligence tools for the collection, organization, storage, and utilization of information, particularly in addressing and resolving crises. Nevertheless, the literature also acknowledges the intricate challenges inherent in Knowledge Management within the tourism sector, owing to its diverse and dynamic nature, as illuminated by Mistilis and Sheldon's (2006) study. Therefore, based on the literature, this study investigates Knowledge Management Processes as a combination of knowledge diffusion, generation, storage, and application, with a focus on their impacts on BI and SP in Saudi Arabia's growing tourism sector.

Strand and Syberfeldt (2020) stated that BI solutions are constantly changing to improve decision-making in organizations by performing tasks such as compiling, aggregating, summarizing, and analyzing large amounts of data. Höpken et al. (2015) proposed a new approach related to Business Intelligence-based cross-process knowledge extraction and decision support. This approach consists of a) a uniform and comprehensive data model that forms the basis of a central data warehouse, b) mechanisms for extracting data from various sources and integrating it into the consistent data structures of the warehouse, and lastly, c) analysis methods to discover important relationships and patterns across various business processes, thus revealing new knowledge.

In addition, previous research indicates that BI includes all the necessary activities, applications, and technologies required for collecting, analyzing, and visualizing business data, addressing both operational and strategic decision-making needs. Sabri et al. (2017) highlighted two views on the meaning of Business Intelligence: (1) a system-based approach that uses various tools to collect, store, and present data, and (2) a process-based approach that makes data ready for analysis by end-users. In Saudi Arabia's tourism industry, BI tools play a vital role in managing data for sustainability-focused decisions, aligned with Vision 2030's goals to enhance economic growth while preserving cultural and environmental resources.

Moreover, previous studies confirm the growing importance of Business Intelligence in supporting business decisions, analyzing the impact of BI maturity on organizational performance, and recognizing its potential as a source of sustainable competitive advantage for organizations (Suša Vugec et al., 2020). However, despite these insights, the implications of the BI schema are still not well developed and established. In conclusion, an understanding of BI systems enables any organization to implement an analytical approach that transforms data into information, information into knowledge, and then knowledge into decisions. Hence, KMP involves knowledge diffusion, generation, storage, and application by capturing, storing, organizing, and distributing knowledge, while BI converts data into knowledge for the needs of the end-user by identifying trends for new business strategies. As KMP and BI work together, they enable sustainable decision-making, essential for tourism sectors in emerging economies like Saudi Arabia, where both economic and environmental goals are pursued (Akram et al., 2019; Wu and Haasis, 2013). Sustainability in socioeconomic research has become a prominent topic within the past decade, especially in the tourism sector. Sustainability in tourism means taking into account the present and future economic, social, and environmental effects, and meeting the expectations of visitors, industries, the environment, and host communities. Elmo et al. (2020) suggested that sustainable tourism motivates the efficient use of resources to achieve environmental, social, and economic goals, which include cultural integrity, biological diversity, ecological processes, social and economic equity, and overall improvement. Franzoni (2015) stated that to measure tourism sustainability, one needs to comprehend the complexity of tourism systems and the specific features of each destination. Moreover, previous studies have emphasized that in the knowledge economy, sustainability depends on the generation, dissemination, and utilization of knowledge (Menaouer et al., 2022).

However, prior literature raises the need for further investigation, in order to evaluate global best practices for sustainable tourism (Franzoni, 2015; Laitamaki et al., 2016; Yoopetch and Nimsai, 2019). This study, therefore, establishes the role of Knowledge Management Processes and BI systems (data warehouse, data mining, dashboard) in enhancing SP (economic, social, and environmental) to develop a framework specifically suited for Saudi Arabia's tourism sector under Vision 2030. Consequently, the following hypotheses are put forward:

H1: Knowledge management practices positively influence business intelligence.
H2: Business intelligence positively influences sustainability performance.
H3: Knowledge management practices positively influence sustainability performance.

Fig. 1 presents the proposed research framework, which is derived from the research objectives, hypotheses, and literature review that have been explained above.

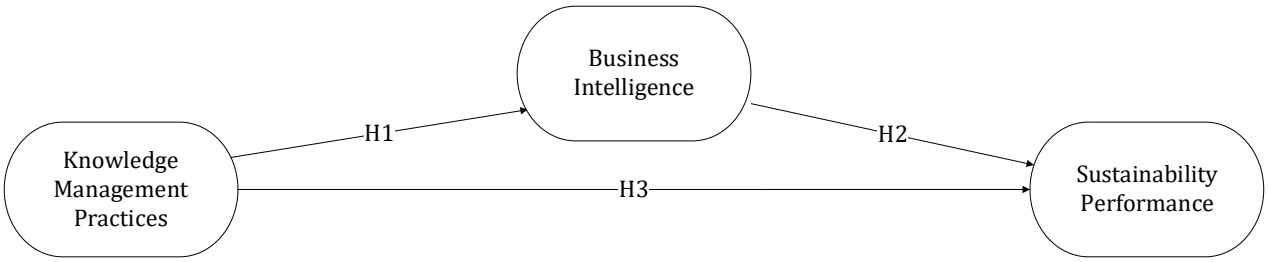

Fig. 1: The conceptual model with the research hypotheses

2. Research methods

2.1. Sample and procedures

This study was conducted among several companies within Saudi Arabia's tourism sector. To capture insights specific to Saudi Arabia's tourism industry, electronic surveys were chosen as the most effective method for reaching a large and geographically dispersed population. This approach ensured consistency across all respondents, thereby improving the accuracy of the gathered information (Hair et al., 2011). Electronic surveys have proven effective in prior studies focused on tourism and sustainability, providing broad coverage and a reliable method of data collection (Raissi and Hakeem, 2023), where they were used to assess Knowledge Management (KM), BI, and SP within these organizations. A well-crafted survey questionnaire specifically targeted these key areas.

Over a five-month period, from March to September 2024, a total of 2,600 questionnaires were distributed across these companies, resulting in 893 responses from 298 companies. To maintain data consistency and reduce potential biases, at least two responses were collected from each company, leading to a final response rate of over 35%, which is considered both high and satisfactory.

2.2. Data analysis techniques

The study focused on testing proposed causal relationships by exploring multiple independent and intervening variables through research hypotheses. Structural Equation Modeling (SEM) was employed for data analysis, utilizing SPSS (Statistical Package for the Social Sciences) Version 24 and SmartPLS 3.0 (Partial Least Squares Path Modeling) software. Given the exploratory nature of this study, PLS path modeling was selected over the traditional covariance-based SEM (CBSEM) approach. Although many previous studies have relied on a CBSEM approach, this study chose PLS path modeling for several key reasons. Firstly, PLS path modeling is more user-friendly when handling formative constructs, whereas CBSEM tools like AMOS, although capable, are rarely used for this purpose due to their complexity (Hair et al., 2016). Secondly, PLS path modeling is particularly well-suited for exploratory research, such as this study, while CBSEM is generally preferred for theory testing (Fornell and Bookstein, 1982). Additionally, by accommodating principal component analysis (PCA) outputs, PLS path modeling provides enhanced data accuracy, ensuring reliability even when multicollinearity is present. Thirdly, PLS path modeling does not impose restrictive assumptions on the data, making it versatile enough to accommodate reflective and formative constructs, small samples of fewer than 100, single-item constructs, metric and non-metric data types, multicollinearity, and even missing values (Hair and Alamer, 2022). Given these advantages, PLS path modeling is recognized as a 'soft-modeling' method, ideal for this research.

2.3. Measurement

The study utilized well-established measures for each construct, commonly used and validated in prior research, with strong validity and reliability. A 7-point Likert scale, ranging from total disagreement to total agreement, served as the measurement instrument to ensure consistency across items and constructs. The research model included three latent variables with a total of 73 items, as follows: Knowledge management practices as independent variable (41 items), (Ode and Ayavoo, 2020); Business intelligence as mediator variable (10 items), Sustainability performance as a dependent variable (22 items), (Asiaei et al., 2021).

3. Results

Once the Average Variances Extracted (AVE) has been calculated in Table 1, the discriminant validity is to be analyzed using the following measures: 1) the Fornell-Larcker Criterion, 2) Cross-Loadings, and 3) the criterion of Heterotrait-Monotrait Ratio. With regards to the Fornell-Larcker Criterion, Fornell and Larcker (1981) hypothesized that there should be a correlation between each latent variable and its indicator. Thus, to ensure discriminant validity, the AVE of each construct ought to be higher than the latent variable's highest squared correlation with any other latent variable. For this study, the AVE values of all latent variables were as follows: BI was 0.964, KMP was 0.875, and SP was 0.849. These values all show that the self-AVE for each latent variable is greater than the other variables, as illustrated in Table 2.

Regarding the cross-loading test, each item's loading was found to be higher than all of its cross-loadings. Additionally, items with loadings over 60% met the acceptable threshold for factor loading, reaching the necessary cut-off point. As a result, the items aligned with their original variables, with no overlap between them.

Regarding the criterion of inner variance inflation factor (VIF) values in this study, all values were close to 1 (specifically 1.007 for BI and KMP (Table 3)), indicating minimal multicollinearity among the constructs. With VIF values near 1, there is no harmful collinearity present in the model. In summary, the analysis confirms that the constructs are unique and contribute independently to the model, supporting the reliability and validity of the reflective measurement of latent variables across all indicators (Table 4). Based on Table 5, the study's key findings indicate a strong relationship between KMP and SP within organizations. More specifically, as the levels of knowledge diffusion, generation, storage, and application increase, so does sustainability performance. This suggests that more robust KMP leads to enhanced BI, which, in turn, further improves sustainability outcomes. Moreover, the study confirms a strong connection between BI and SP. The mediating role of BI in linking KMP to SP was validated, as hypothesized.

Table 1: Reliability and validity test

Construct	No. of questions	Cronbach's alpha	Composite reliability	AVE	DV/IV
KMP	41	0.991	0.992	0.928	IV
BI	10	0.992	0.992	0.766	Med
SP	22	0.982	0.983	0.721	DV

DV: Dependent variable; IV: Independent variable; Med: Mediator variable

Table 2: Construct correlation: The Fornell-Larcker criterion

Construct	BI	KMP	SP
BI	0.964		
KMP	-0.081	0.875	
SP	-0.194	0.685	0.849

Table 3: The Heterotrait-Monotrait ratio (HTMT)

Construct	BI	KMP	SP
BI			
KMP	0.080		
SP	0.201	0.687	

Table 4: The inner VIF values

Construct	BI	KMP	SP
BI			1.007
KMP	1.000		1.007
SP			

Table 5: Total effects

No.	Relationships	O	M	SD	T-statistics	P-values	Results
1	KMP → BI	-0.081	-0.083	0.032	2.521	0.012	Supported
2	BI → SP	-0.139	-0.140	0.034	4.098	0.000**	Supported
3	KMP → SP	0.674	0.674	0.028	24.167	0.000**	Supported
4	KMP → BI → SP	0.011	0.012	0.006	2.043	0.041	Supported

O: Sample; M: Sample mean; SD: Standard deviation; *: Significant at $p < 0.05$; **: Significant at $p < 0.01$

3.1. Mediator analysis

Fig. 2 presents a model from Sarstedt et al. (2022) that outlines the systematic process for mediator analysis in PLS-SEM. Accordingly, this study focused on examining the indirect effects of mediation and identifying the specific type of mediation that occurs. Based on the results from Table 5 and the p-values of the effects, the following conclusions can be drawn: KMP→BI (P1) and BI→SP (P2) are statistically significant at a0.012% and 0.000% level of significance, thereby fulfilling the requirements for the first step of mediator analysis for P1 and P2. Additionally, KMP→SP (P3) is also statistically significant at a 0.000% level of significance, meeting the requirements for the second step of mediator analysis for P3. Furthermore, KMP→BI→SP is statistically significant at the 0.041% level, satisfying the requirements for the third step of mediator analysis for P1 and P2 (Fig. 3).

3.2. Model fit

As this study utilized PLS path modeling, variance explained (R2) was employed to assess the model fit. Recent studies have introduced additional measures for evaluating model fit, such as goodness of fit (GoF) (Wetzels et al., 2009; Vinzi et al., 2010) and predictive relevance (Stone-Geisser's Q2). After establishing the validity and reliability of the measurement model, the conceptual model was assessed using path coefficients and the explained variance (R2) of the dependent variables.

R2 indicates the in-sample explanatory power of the model, with values ranging from 0 to 1, where higher values represent greater explanatory power. Regarding the effect size of R2, Cohen (1992) suggested that an R2 value of 0.26 indicates a large effect, 0.13 indicates a medium effect, and 0.02 indicates a small effect, as shown in Table 6. Business Intelligence demonstrated a small effect, while sustainability performance exhibited a large effect.

As depicted in Fig. 4, the structural model in this study explains 67% of the variation in the Business Intelligence construct and 53% of the variation in the EO construct. Regarding predictive relevance (Stone-Geisser's Q2), Chin (1998) stated that a Q2 value greater than 0 indicates predictive relevance. The results presented in Table 7 show that Business Intelligence achieved a Q2 value of 0.004, while Sustainability Performance reached 0.466, indicating that the study model has high predictive relevance and an acceptable fit.

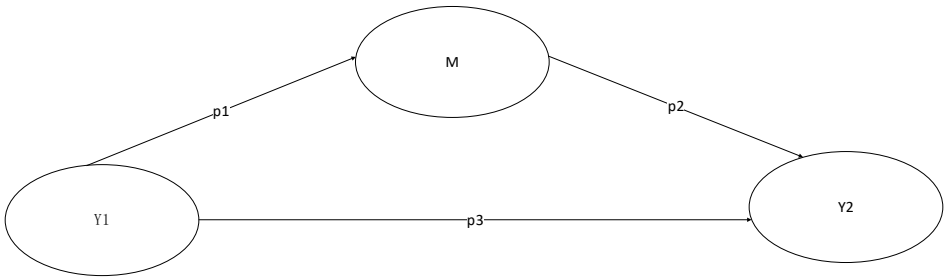

Fig. 2: Example of a simple mediator model

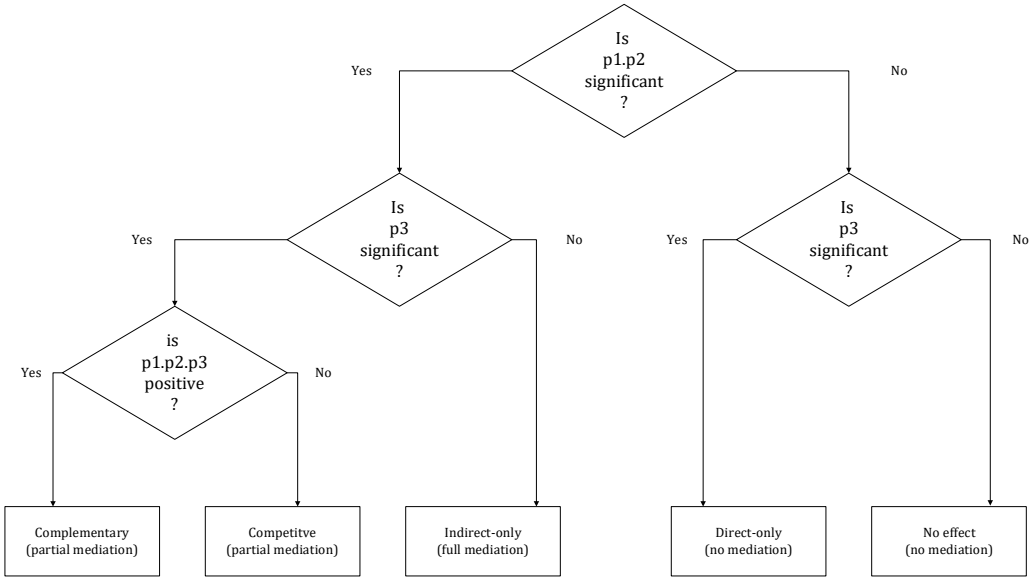

Fig. 3: Explanation of the systematic mediator analysis process in PLS-SEM

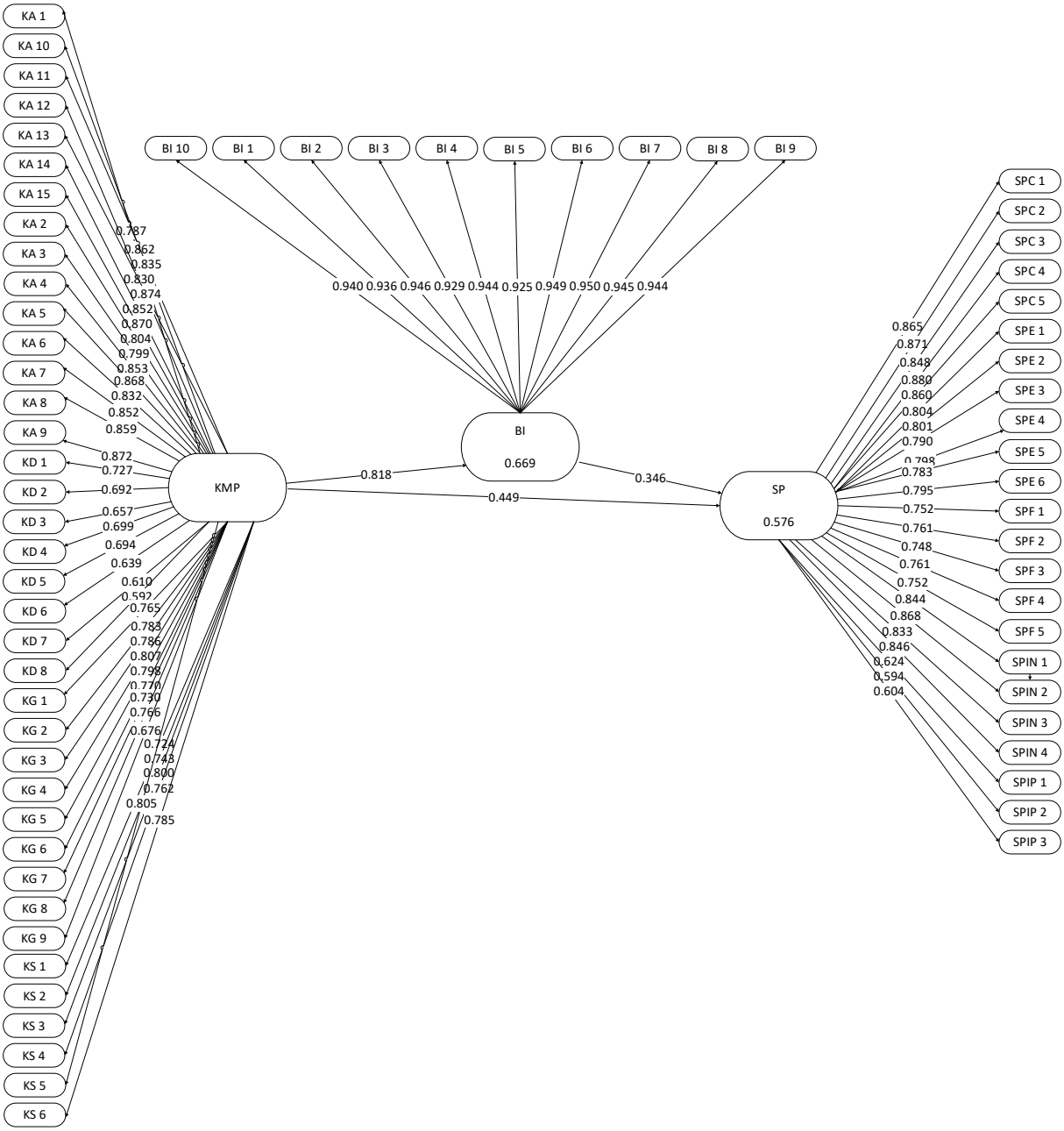

Fig. 4: The structural model with estimated parameters

Table 6: Explained variance for dependent variables

Construct	R square	Classified
BI	0.007	Small
SP	0.489	Large

Table 7: Stone-Geisser's Q^2

Construct	Q^2
BI	0.004
SP	0.466

Vinzi et al. (2010) defined the GoF as a global fit measure, calculated as the geometric mean of the R^2 of the endogenous (dependent) variables and the AVE. This measure is designed to evaluate the study model at both the structural and measurement levels, providing an overall assessment of the model's performance (Wetzels et al., 2009; Vinzi et al., 2010; Henseler and Sarstedt, 2013). The formula to calculate GoF is as follows:

$$\text{GoF} = \sqrt{\left\{\overline{\{R^2\}} \times \overline{\{AVE\}}\right\}}$$

The GoF of the measurement model was checked and evaluated accordingly to be 0.429. The findings indicated that the model fit was acceptable. According to the criteria for a globally valid PLS model set by Wetzels et al. (2009), GoF values are classified as follows: No fit (less than 0.1), small fit (0.1-0.25), medium fit (0.25-0.36), or large fit (greater than 0.36). The GoF value for this model was 0.429, indicating a large fit and validating its global PLS model status. Additionally, to assess the GoF for the measurement model, the standardized root mean square residual (SRMR) was used. This measure evaluates the squared discrepancy between the model-implied and observed correlations, with a recommended value close to 0 or less than 0.08. In this study, the SRMR value was 0.056, supporting the overall model fit.

4. Discussion and implications

This study investigates how KMP–specifically knowledge diffusion, generation, storage, and application–interact with BI systems (including data warehouses, data mining, and dashboards), to influence SP across various dimensions. These dimensions encompass financial performance, customer satisfaction, internal business processes, innovation and learning, as well as social and environmental impact. By exploring these elements within the Saudi Arabian context, this study aligns closely with the strategic objectives of Vision 2030, which seeks to integrate knowledge-driven and sustainable practices within the country's growing tourism sector.

Based on the findings, the study suggests a strong relationship between effective Knowledge Management and the successful utilization of BI systems. It posits that organizations that prioritize and effectively manage their knowledge processes are better positioned to leverage BI tools, thereby enhancing their sustainability performance. Moreover, the adoption of BI strategies is proposed to amplify the positive effects on sustainability, enabling organizations to achieve more significant financial, social, and environmental outcomes. This relationship highlights the importance of integrating Knowledge Management with BI to drive holistic, sustainable success in organizations. This relationship emphasizes the importance of integrating KMP and BI within tourism organizations, particularly in emerging economies like Saudi Arabia, where sustainability and innovation are becoming competitive differentiators. For example, knowledge diffusion allows critical information about sustainability goals to flow across departments, ensuring alignment in decision-making. Similarly, knowledge application ensures that insights derived from BI tools are translated into actionable strategies, such as implementing energy-saving initiatives or sustainable resource allocation.

The surveys conducted for this study were all centered on companies within Saudi Arabia's tourism sector, a key industry that plays a pivotal role in any economy (Hakeem, 2023). The decision to focus solely on Saudi Arabian companies aligns with recent literature that emphasizes the importance of considering cultural differences when applying study models (Menaouer et al., 2022). Consequently, several important theoretical implications can be derived from these findings. This sector-specific focus contributes unique insights that highlight the role of KMP and BI in achieving Vision 2030's sustainability goals, which is what makes this study gap so pertinent. Consequently, several important theoretical implications arise from these findings.

First, building on the theory of organizational information processing and the Knowledge-Based View (KBV), this study hypothesizes that stronger KMP leads to more successful SP in organizations. According to these theories, the primary role of a firm is to create, transfer, and apply knowledge. Therefore, firms that excel in managing and applying knowledge related to sustainable practices are likely to achieve superior sustainability performance. In the Saudi tourism sector, effective knowledge diffusion, storage, and application are essential for developing sustainable innovations that can provide a competitive edge. For example, knowledge generation could involve gathering data from customer surveys to design eco-friendly travel packages, while knowledge storage might include implementing cloud-based systems to ensure sustainability data is accessible and up-to-date across departments.

The findings support this hypothesis (H3), revealing a positive relationship between KMP and SP. Specifically, practices such as knowledge diffusion, generation, storage, and application promote successful sustainability performance by enabling systematic information collection and analysis, objective alternative selection, and the integration of external sources in decision-making (Hakeem, 2023). For practitioners, this means that

investment in tools like enterprise knowledge management systems and BI dashboards can enhance the ability to track and implement sustainability metrics effectively.

These findings suggest that Saudi Arabian tourism organizations should strive to maximize sustainability performance by gathering comprehensive information and exploring better alternatives. This approach often requires decision-makers to invest more time in exploring and evaluating better alternatives (Stroh et al., 2002). The findings of this research are consistent with prior studies that have shown successful sustainability outcomes in organizations are more likely when adequate information and effective implementation strategies are employed (Alarifi et al., 2019; Martins and Perez, 2020; Covin et al., 2020; Hakeem, 2023).

For instance, Saudi tourism companies could benefit from assessing environmental impacts and consulting experts to balance business objectives with sustainability considerations, thereby aligning with Vision 2030's emphasis on environmental responsibility. For example, a large hotel chain in Saudi Arabia enhances its sustainability performance by collecting and analyzing data on energy consumption across its properties. By implementing automated systems to control lighting and HVAC based on occupancy, the company not only reduces costs but also lowers its carbon footprint, demonstrating how data-driven decision-making can maximize value and benefit. Similarly, knowledge application ensures that such data-driven insights are integrated into operational policies, creating a culture of sustainability throughout the organization.

Additionally, drawing upon the theories of organizational information processing, the Knowledge-Based View (KBV), and Decision-Making Theory, this study hypothesized that organizations that prioritize and effectively manage their knowledge processes are better positioned to leverage BI tools, including data warehouses, data mining, and dashboards. The findings support this hypothesis (H1), indicating a positive relationship between KMP and the effective use of BI. This result is consistent with previous studies that have shown how robust Knowledge Management can enhance organizational actions through the use of BI tools (Menaouer et al., 2022). In the context of Saudi Arabia's tourism sector, this suggests that companies implementing KMP are more likely to enhance their BI capabilities, facilitating data-driven decisions that support sustainable tourism growth.

Moreover, the research demonstrates that in competitive environments, effective KMP not only enhances the functionality of BI tools, but also empowers decision-makers to seize opportunities. By integrating analytical processes into strategic decision-making, organizations can better evaluate critical opportunities, leading to more informed and timely decisions.

Moreover, Knowledge Management plays a crucial role by ensuring that decision-makers have access to the most relevant and up-to-date information, ultimately improving the quality of decisions. Therefore, the study confirms that investing time in collecting and analyzing information during strategic decision-making is a valuable practice.

Furthermore, this study applies Resource-Based Theory (Barney, 1991), treating BI systems as essential resources that enhance an organization's competitive advantage in the Saudi tourism context. Using Systems Theory, the study views BI systems as integrative tools within the organizational framework, providing a holistic perspective on operations and sustainability performance. By connecting various data points—such as those from supply chain, operations, and marketing—BI systems enable organizations to understand how different components affect sustainability performance, leading to more informed decisions and optimized strategies. Moreover, drawing on Competitive Advantage Theory, the study highlights how BI systems provide the data and analytics necessary to identify and exploit opportunities for competitive advantage, particularly in sustainability. By leveraging BI tools, organizations can develop unique, sustainable practices that differentiate them in the marketplace, driving both economic and sustainability performance.

The findings support the hypothesis (H2) that stronger BI systems lead to more effective sustainability performance. More specifically, the positive relationship between BI systems and sustainability performance suggests that higher levels of BI enhance an organization's ability to achieve a sustainable competitive advantage and superior performance. This evidence demonstrates that BI systems, as critical organizational resources, are integral to improving sustainability performance. Organizations within Saudi Arabia's tourism sector can capitalize on this by strategically investing in BI technologies aligned with their sustainability goals, thus gaining a competitive edge in a rapidly growing industry.

This conclusion aligns with prior research, which emphasizes the role of BI in driving strategic initiatives and improving organizational performance (Lumpkin and Dess, 1996; Wiklund and Shepherd, 2005; Covin and Wales, 2019). The findings also underscore the importance of strategic investments in BI, as these investments can yield substantial returns for companies that prioritize data-driven sustainability initiatives (Božič and Dimovski, 2019).

This study also expands the geographical scope of research on KM, BI, and sustainability to the Arab region. The positive relationships found in Saudi firms are notable, as companies in this region often face resource constraints, making the optimization of domestic capabilities crucial for remaining competitive. Unlike many Western tourism firms, which often benefit from robust AI ecosystems and well-established BI infrastructures, Saudi firms have rapidly adopted these technologies within a context

of resource constraints, showcasing their resilience and innovation under Vision 2030.

Additionally, while European firms leverage long-standing sustainability policies and institutional support, Saudi Arabian firms are uniquely positioned to integrate cutting-edge AI and BI within a rapidly evolving regulatory and economic landscape. This distinction underscores the adaptive strategies employed by Saudi firms in response to regional challenges.

Unlike some European and Latin American countries (Kshetri, 2014), Arab firms—particularly those in Saudi Arabia—have increasingly focused on Artificial Intelligence (AI), BI, and strategies that enhance operational sustainability. This focus has enabled Saudi companies to drive significant economic growth (Yusuf and Al-Banawi, 2016; Božič and Dimovski, 2019).

In this context, corporate leaders in Saudi Arabia can greatly benefit from this research, as it highlights the positive impact of knowledge management, Business Intelligence, and sustainability on business performance. The urgent need for companies to rapidly analyze data and gain insights for a sustainable competitive advantage is crucial, especially with the rise of AI as a strategic tool. AI, which leverages both machine and human intelligence, can empower strategic decision-makers to uncover new opportunities and encourage market entry ahead of competitors. In contrast to Latin American firms, which often face slower AI adoption rates due to infrastructure gaps, Saudi firms have leveraged Vision 2030 to fast-track AI integration, creating competitive advantages in tourism and sustainability.

AI also offers insights into emerging market trends, helping companies stay competitive. For Saudi Arabian companies, this is particularly relevant as AI, the knowledge economy, and sustainability are key focuses within Vision 2030, offering significant potential to drive innovation and growth across the region. Moreover, Saudi Arabia's approach to integrating AI, BI, and sustainability provides a valuable model for other developing economies aiming to balance resource limitations with ambitious growth targets.

5. Conclusions

This study aimed to explore the influence of Knowledge Management Practices on Sustainability Performance, with a focus on the mediating role of Business Intelligence as a crucial organizational resource. Grounded in theories such as organizational information processing, systems theory, competitive advantage theory, and the resource-based view, this research contributes to the understanding of how knowledge-driven processes and BI systems can support Saudi Arabia's Vision 2030 sustainability goals in the tourism sector. The study sought to determine whether KMP enhances the level of Business Intelligence within companies and whether increased levels of Business Intelligence can positively impact sustainability performance. A quantitative research approach was adopted to address these questions. Electronic questionnaires were distributed to top management team members within tourism companies across Saudi Arabia, chosen for their active roles in organizational decision-making and strategic planning. The collected data were then analyzed using Structural Equation Modeling to test the hypothesized causal relationships in the research framework, which included multiple independent and mediating variables. The study's findings revealed three key insights.

First, KMP was found to significantly enhance the level of BI within organizations. Second, higher levels of BI, driven by effective Knowledge Management practices, were shown to positively influence sustainability performance. Lastly, the study confirmed a direct positive relationship between Knowledge Management practices and sustainability performance, with BI serving as a key mediating factor.

5.1. Limitations and future scope

Despite the generally positive results of this study, several limitations may have influenced the data. The first limitation is that the sample was drawn exclusively from the Saudi Arabian tourism sector. Additionally, since the sample was restricted to Saudi Arabia, the second limitation is that the findings cannot be generalized to the broader Middle East or all Arab countries.

List of abbreviations

AI	Artificial intelligence
AVE	Average variance extracted
BI	Business intelligence
CBSEM	Covariance-based structural equation modeling
DV	Dependent variable
GoF	Goodness of fit
HTMT	Heterotrait-monotrait ratio
IV	Independent variable
KMP	Knowledge management practices
KM	Knowledge management
PCA	Principal component analysis
PLS	Partial least squares
PLS-SEM	Partial least squares structural equation modeling
Q^2	Stone-Geisser's Q^2 (predictive relevance)
R^2	Coefficient of determination (explained variance)
SEM	Structural equation modeling
SP	Sustainability performance
SRMR	Standardized root mean square residual
VIF	Variance inflation factor

Compliance with ethical standards

Ethical considerations

Participation in this study was voluntary, and informed consent was obtained from all

respondents. The survey responses were anonymized to protect participants' privacy, and all data were treated with strict confidentiality.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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