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HOW BUSINESS INTELLIGENCE SHAPES SERVICE INNOVATION: KNOWLEDGE SHARING AS A MEDIATOR AND CULTURE AS A MODERATOR IN THE JORDANIAN CONTEXT

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ABSTRACT

This paper analyze how the use of business intelligence (BI) can be used to increase service innovation within insurance companies and will use the mediating role of knowledge sharing as well as the moderating role of organizational culture. A questionnaire survey was conducted on 223 respondents in the insurance firms in Jordan. Findings of the structural equation modeling (SEM) analysis show that the implementation of BI systems has a positive influence on knowledge sharing and service innovation. In addition, knowledge sharing has a positive impact on service innovation and acts as a mediator in the relationship between BI adoption and service innovation partially. On the contrary, the recommended moderating effect of organizational culture was not supported and the relationship between BI adoption and service innovation continued to be strong, irrespective of cultural variations. These results imply that BI adoption and knowledge sharing have a central role in service innovation, whereas organizational culture may influence the result of service innovation in a more indirect way, via knowledge sharing instead of direct moderating it. The proposed research makes an addition to the resource-based view (RBV) and knowledge-based view (KBV) by incorporating the use of BI technology and social factors in understanding the result of innovations in an emerging market situation. It has made significant theoretical contributions to technologically-driven innovation and pragmatic contributions to the insurers and policymakers about fostering cultures of data-driven innovation and sharing of knowledge.

Keywords: *Business Intelligence, Service Innovation, Knowledge Sharing, Organizational Culture, Jordan, Insurance Companies*

1. INTRODUCTION

In the digital economy of the present, companies are highly pressurized to be creative in their services and operations in order to be competitive (Al-Smadi, 2025). Demands on more innovative services, including personalized policies, quicker claims processing, and online customer experiences, are being placed on the insurance sector, especially, as clients increasingly demand more adaptable services and regulatory mandates evolve (Hussien et al., 2025). The technology in this regard has been identified as BI which basically means the use of information system, data analytics, and tools to collect and analyze business information to make improved deci-

sions. Using BI (e.g. data warehouses, analytical dashboards, and AI-driven insights), companies will be able to discover customer trends, optimize their processes, and find the opportunity to create new services. According to recent studies, organizations that have a high BI and analytics scores are likely to have a high level of innovation performance. Indicatively, Khawaldeh and Alzghoul (2024) discovered that the process of building BI capabilities enhanced the performance of firms and highlighted how the proper management of knowledge leads to the achievement of the desired outcomes. Equally, Mikalef et al. (2020) demonstrated that big data analytics competencies have the potential to both incremental and radical innovation in products and services particularly where firms integrate them as an aspect of dynamic capabilities to adapt. These articles indicate the benefits of BI as innovation driver.

Nevertheless, innovation with BI is not starving at the altar organizational factors are an influential factor in the ultimate success. Specifically, human and cultural setting in a company will play a role in determining the way BI insights are disseminated and applied to develop new services. The importance of knowledge sharing between workers is frequently emphasized as one of the most important facilitators of innovation since the process enables the recombination of ideas and knowledge into new solutions (Castaneda and Cuellar, 2020). Implementation of advanced analytics in the absence of a culture of knowledge sharing may not bring high returns in innovation. Besides, organization culture as such, which is a set of values, norms and practices that define an organization, may either facilitate or hinder innovation. The culture of learning, openness, and risk-taking can be more stimulating to the power of new technology because it will allow the employees to be more experimental with BI-driven insights (Hasan et al., 2025). Conversely, a strict or separated culture may dampen the innovative results of adopting BI through impeding cross-department interactions or readiness to modify (Zhang & Guo, 2024). This is why it is necessary to investigate the intersection of knowledge sharing and organizational culture with the BI usage in order to affect the service innovation.

The aim of the study is to critically examine whether and how BI adoption can result in higher service innovation in insurance companies and to estimate the mediating and moderating effect of knowledge sharing and organizational culture in this association. The research establishes itself in the insurance industry of Jordan providing a global and emerging-market perspective. This research will contribute to the field of study by combining technology, knowledge and cultural dimensions to help in the enhancement of how service organizations can enhance the innovation in the age of analytics.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

BI viewed as a strategic organizational resource regarded through the perspective of resource-based view (RBV) and dynamic capabilities that allow firms to detect and react to innovation opportunities (Alsaad et al., 2022). BI systems (such as data warehouses, reporting systems, and analytics systems) enable the decision-maker to get timely and data-driven information, which can boost the understanding base and responsiveness of the firm (Khaddam, 2024; Obeidat, 2022). This enhanced informational capability has the capacity to drive service innovation, which can be viewed as the adoption of new services or major advancements in the existing services, service processes, or the provision of better customer experience. The RBV suggests that organizations can gain a competitive advantage by building a high-quality innovation because they successfully deploy distinct IT resources such as BI (Alawamreh et al., 2023; Khawaldeh and Alzghoul, 2024; Willie, 2024). The dynamic capabilities perspective also implies that to respond to a dynamic environment, companies must integrate and reorganize resources (including BI and data) and, therefore, lead to the results of innovation (Alsaad et al., 2022; Stoeber and Kanbach, 2025). The adoption of BI, the degree to which an organization

employs BI tools and analytics in its operations and decision-making, may, therefore, support the ability of a firm to formulate and actualize new service concepts (Blommerde, 2023).

An expanding literature confirms the positive relationship between BI (and other analytics technologies) and the performance of innovation. As an example, Aljehani et al. (2024) discovered that the level of big data analytics capabilities improved the performance and overall performance of firms considerably, particularly in the cases when they were accompanied by the robust knowledge management practice. Similarly, Ghasemaghaei and Calic (2020) also found that increasing product and service innovation through the exploitation of large data sets and analytical tools was linked to the increased amount of data, but it was also noted that the quality and usefulness of data is important. Del Vecchio et al. (2018) emphasized the importance of analytics in open innovation, and both small and big companies utilize big data/BI to take market tendencies and develop solutions together. Closer to BI, Alsaad et al. (2022) showed that the development of BI competencies allows a company to better serve new service products, through a dynamic capabilities prism. Their research in the Middle East revealed that companies with strong BI practices had ability to detect customer needs faster and generate innovative services to meet the needs on a faster pace. Similarly, Zheng et al. (2022) also found that Big Data Analytics strengths increased the process of exploratory and exploitative innovation in micro-enterprises through agile data-driven decision support.

The same is reflected in research conducted in emerging economies and on service sectors. According to the recent research involving export-oriented firms in Indonesia, the use of BI positively impacted organizational innovation significantly, which increased the competitive edge in the end (Kusmantini et al., 2021). Abu Ruman and Al-Kasasbeh (2023) have explored the issue of insurance companies in the context of Jordan and the results indicated that a combination of BI success factors (top management support, data quality, etc.) had a statistically significant positive impact on organizational innovation. It means that in the rather conservative industry, the adoption of BI tools may contribute to innovation by promoting the creation of more informed services. On the whole, the empirical data seems to follow a similar trend: the organizations active in the sphere of BI technologies investment and active usage are more likely to become more innovative in their services and processes, and in the service sector is not an exception. The BI assists firms in determining innovation opportunities (e.g., unmet customer needs or inefficiency in service delivery) and in testing the new concepts of services with a stronger feeling of certainty.

Knowledge sharing is where individuals or units in an organization share information, skills and expertise with one another. It is a major element of the knowledge management and a promoter of organizational learning (Abu Lehyeh and Alzghoul, 2024; Cheng et al., 2024; Obeidat et al., 2021). The use of BI systems may affect knowledge-sharing practices and activities in a number of ways. To begin with, BI technologies tend to be a central repository and distribution of data and reports, which make knowledge more accessible within the organization (Sharma and Djiaw, 2011; Hammadi et al., 2024). The knowledge-based view (KBV) of the firm assumes that knowledge that is stored and distributed with the help of technologies can increase the knowledge-sharing ability of a firm, which subsequently raises the quality of decisions and innovation (Cui, 2025). By eliminating information silos, BI systems provide a shared information infrastructure, which stimulates departments and employees to make use of the same information and insights. Such a shared platform can be used to create a culture of evidence-based conversation and education that can be a stimulus to knowledge sharing (e.g. with dashboards, employees are able to see performance metrics and openly discuss them). Secondly, there are social and cognitive theories (e.g., the socio-technical systems theory) that imply that the work patterns and social interaction changes with the introduction of the advanced information systems, such as BI (Margherita & Braccini, 2021). Employees can be encouraged to share the findings and best

practices freely with colleagues as they interact with BI outputs (analytical reports, visualizations), and BI can become part of their routine ways of collaborating. In this way, the adoption of BI is likely to enhance the level of knowledge sharing and communication within the company.

The recent empirical literature demonstrates that the use of BI is associated with better knowledge sharing and knowledge management. Kusmantini et al. (2021) in a study of Indonesian firms discovered that business intelligence positively influenced knowledge sharing that consequently improved the competitive advantage. This implies that the more companies are adopted to BI, the more employees are willing or capable to share knowledge, which might be due to the fact that data-driven insights tend to initiate conversations and learning. In a similar study, Alsarayreh et al. (2025) based on a study focusing on telecommunication companies in Jordan found out that BI capabilities played significant roles in strategic knowledge sharing which mediated their impacts on organizational outcomes. Abusweilem and Abualoush (2019) have shown previously that a combination of BI tools and knowledge management processes resulted in increased organizational performance, which highlights the fact that BI and knowledge-sharing processes complement one another. These results correlate with the idea that BI tools can be used as triggers of knowledge flows.

Evidence of the case also indicates that BI has enhanced more collaborative and knowledge-driven work climate. To provide an example, Ferraris et al. (2019) observed that firms having advanced analytics formed the so-called knowledge management perspective, that is, they used data insights in the interdepartmental context, which proved essential in enhancing performance. Dashboards and self-service analytics are often part of BI implementation and can be used by employees of various levels; it has been demonstrated that in the case when employees have access to the tools, they discuss metrics and insights more often and make organizations more transparent and knowledgeable (Shabbir and Gardezi, 2020). Also, the existence of the BI could provoke the necessity of cross-functional teams (e.g., IT cooperating with business units) to interpret and utilize the information, which will raise the interdepartmental communication. Overall, the evidence that BI implementation is related to the improved knowledge sharing can be found in numerous empirical studies conducted in different settings (manufacturing, telecom, export SMEs, and others). Regardless of the formal (shared databases, knowledge repositories) or informal (more data-driven conversations and communities of practice) means of knowledge sharing, this pattern is attributed to BI implementation.

Innovation theory and organizational learning literature have well established the link between knowledge sharing and innovation (Afaishat et al., 2025). According to the knowledge-based view, knowledge is the most strategic resource for innovation; new products and services arise from the combination and recombination of existing knowledge in novel ways (Chen et al., 2023; Nakash, 2025; Qawaqneh et al., 2023). Knowledge sharing is a way for an organization to spread and combine its knowledge assets, which encourages creativity and new ideas (Khan & Niazi, 2023). When employees are free to share their thoughts, ideas, and best practices, the company can work together to find ways to improve service and solve problems. Conversely, the hoarding or siloing of knowledge can lead to the duplication, stalling, or limitation of innovation efforts (Castaneda & Cuellar, 2020). Social capital theory also suggests that interaction and trust (facilitators of knowledge sharing) enhance an organization's innovative capacity by improving access to diverse information and perspectives (Akhavan & Hosseini, 2015). Innovation in service industries can take the form of front-line staff providing customer feedback and ideas to development teams or various functional departments (i.e. underwriting, claims and IT in the insurance industry) working together to develop integrated service solutions (Santos-Vijande et al., 2016). Active knowledge sharing hence becomes a source of on-going service innovation.

The empirical evidence supports the fact that innovation performance is greatly propelled by

knowledge sharing. In a literature review, Castaneda and Cuellar (2020) come to the conclusion that in different settings, organizations that support knowledge sharing are more likely to achieve innovation results, and the concept of knowledge sharing is used as a core foundation on which organizational innovation is based. This review has summarized and included the results of numerous research papers and has discovered strong positive association between the knowledge exchange of employees and the indices of innovation (the number of new products, service improvements or the number of patents). In the real estate service industry, the survey by Lee et al. (2023) persuaded a large number of participants that organizational culture can indirectly affect innovation performance via knowledge sharing, which means that knowledge sharing has a direct strong impact on innovation. Their findings showed that, in cases where knowledge sharing is great, the agencies attained more innovative results in their services, a fact that proves sharing knowledge is a necessary intermediate stage to transform resources into innovation. The same is true of emerging economies and service organizations since they are concerned with the relevance of knowledge sharing in terms of innovation. In a review of the literature on developing countries, Dube (2024) observed that the idea of knowledge sharing is essential in innovation, business performance, economic growth, and sustainable development. Previous research has found that knowledge-sharing practices (like communities of practice, mentoring, and open communication channels) significantly boost innovation capability and the implementation of new ideas (Islam et al., 2024; Rehman et al., 2021). Even at the micro level, employees who actively share knowledge tend to exhibit more innovative work behaviors (e.g., generating and implementing new ideas), as demonstrated by studies on knowledge sharing and individual innovation behavior (Wang, 2025). These micro-level innovations aggregate to make organizational service innovation improvements.

BI systems provide data and insights, but it often requires human interpretation and collaborative problem-solving to convert those insights into innovative services (Tawalbeh et al., 2025). If an insurance company adopts a new BI tool, the tool might, for example, identify a pattern in customer behavior. Whether that pattern leads to a new insurance product could depend on employees discussing the insight, combining it with their tacit knowledge, and collectively brainstorming service solutions. Knowledge sharing is in essence a sharing of knowledge in action. In case of the lack of effective knowledge sharing, the BI insight can go unexplored or misinterpreted (Popovic et al., 2012). The mediation hypothesis is based on the assumption that BI adoption enhances the quality and quantity of knowledge the organization possesses that should be disseminated and used by employees to generate an innovation. Sharing knowledge, therefore, transforms the potential of BI (raw data, analytics outputs) into the achieved innovation (new services, improved processes). The mediated relationship aligns with socio-technical systems theory: technology affects social processes '*knowledge sharing'*, which then affects outcomes '*innovation*' (Ang et al., 2024; Mikalsen et al., 2021). It also resonates with absorptive capacity theory, BI increases the firm's ability to absorb information, but it's through internal knowledge dissemination and application (key components of absorptive capacity) that innovation is achieved (Sancho-Zamora et al., 2021).

Prior research provides evidence of similar mediated relationships. Shabbir and Gardezi (2020) found that the effect of big data analytics adoption on organizational performance was practically mediated by knowledge management practices, meaning that analytics improved performance largely by enhancing knowledge generation and sharing inside the firm. Although their study looked at overall performance, innovation is a subset of performance outcomes, and knowledge practices were the conduit (Alzghoul et al., 2024; Khaddam et al., 2023). Wang et al. (2023) also indirectly support this mediation logic: they showed that information sharing (a form of knowledge sharing) and strategic alignment were necessary for big data use to trans-

late into organization-wide innovation. In their "trickle-down" model, top-level big data usage only improved innovation when accompanied by effective sharing of information throughout the organization, implying a chain effect from data to sharing to innovation. Another relevant study by Kusmantini et al. (2021) explicitly found that knowledge sharing and innovation acted as mediators between BI and competitive advantage. In that model, BI's contribution to firm success went through enhancing knowledge sharing and subsequent innovation. Similarly, the Jordanian telecom study (Alsarayreh et al., 2025) concluded that BI's impact on strategic outcomes was mediated by knowledge sharing, all latent variables (BI, knowledge sharing, and ambidexterity) were significant, with BI positively impacting ambidexterity through the mediating influence of knowledge sharing.

Within the insurance sector, while direct studies on mediation are limited, the study can extrapolate from knowledge management findings. The insurance companies are information-rich and knowledge-based organizations, which are concerned with policies, risk assessment, claims, and so on. In case a new BI system is introduced, the success of the new system in encouraging innovation (a new risk assessment service or a tailored plan of the policy) is likely to be achieved when the underwriters, risk managers, IT analysts, and marketers exchange their knowledge and work hand-in-hand. As an example, Awad et al. (2024) emphasized the mediating role of knowledge sharing, which connects the big data use to organizational innovation in Jordanian insurance organizations. They admitted that innovation demands both technical data development and knowledge sharing. This concept is congruent with our mediation. Nevertheless, it is likely that some of the impact of BI on innovation is transferred through the knowledge sharing channels. That is, BI could enhance the results of innovation not just due to its immediate analytics functionality but also by facilitating improved knowledge flows which may subsequently result in innovation. This leads to a mediation effect, in which knowledge sharing is an intermediate process that explains how or why the adoption of BI leads to service innovation.

Organizational culture is a set of shared values, norms, and assumptions that lead to behavior in an organization. It also determines the effect of innovations on the employees and their cooperation in innovations (Pham et al., 2024; Tadesse Bogale and Debela, 2024). The researchers postulate that organizational culture mediates the impact of BI adoption on service innovation. In particular, a conducive, innovation-focused culture could enhance the influence of the BI on the innovation process, and a conservative or strict culture could undermine it. This is expected to happen on the basis of several theories. To start with, the interactionist approach to organizational behavior implies that the effectiveness of technology will depend on contextual characteristics such as culture (Wiese et al., 2024). The benefits of BI are likely to be increased by the culture conducive to knowledge sharing, experimentation, and openness to change (Nguyen et al., 2022). The latter employees in such cultures will be more inclined to utilize a new BI tool, share the findings of their discovery based on the data available, and come up with new ideas of services independently. They will not be afraid of being blamed of failures and will also be encouraged to use the BI insights in an innovative way. Conversely, a hierarchical or status quo-based culture or a risk-averse culture may have employees either refuse to use BI or apply it only to perform routine operations, thus dulling the innovation-driven power of the technology (Cao et al., 2025). This reasoning is in line with Hasan et al. (2025), who observe that the effects of digital transformation (such as operations improvements) are usually curtailed by organizational culture; even a powerful technology cannot deliver without a receptive culture.

Second, organizational fit models suggest that the positive results of the fit between technological initiatives and cultural values are more positive (Chen et al., 2018; Perez-Temprano et al., 2023). In the event that BI adoption applies well in a culture of data-driven decision-making and constant improvement, it will better model into service innovations. On the other hand, misfit

may lead to inappropriate usage of BI to develop innovations. Previous meta-analytic studies have demonstrated the positive relationships between some culture characteristics, particularly, adhocracy cultures (dynamic, entrepreneurial cultures) and innovation and the inhibitory nature of hierarchical cultures (Buschgens et al., 2013; O'Reilly et al, 2021). Although there is no direct empirical evidence of culture modulating the effect of BI on innovation, indirect evidence is available in other areas. Chen et al. (2018) and Tadesse Bogale and Debela (2021) observed in the context of innovation strategy that supportive cultures that are flexible promote the implementation of innovation, and the incompatibility between the culture and innovation strategy may result in poor performance. A second recent paper (Lee et al., 2023) has suggested that cultural factors (including supportiveness) mediate innovation through knowledge processes, suggesting that cultural moderations of technology-innovation relationships, in this case, would find a stronger association with supportive cultures. In addition, according to Khan et al., (2021), the companies that had a learning-oriented culture were able to derive a greater number of innovative results of their new digital tools compared with those that had a traditional culture, which confirms the premise of moderation. This study is aimed at investigating the effect of the use of BI in service innovation within insurance companies and how knowledge sharing and organizational culture impacts this relationship. Based on evidence and theoretical arguments, the hypotheses of the research were as follows:

H_1: Business intelligence adoption has a positive effect on service innovation.

H_2: Business intelligence adoption has a positive effect on knowledge sharing.

H_3: Knowledge sharing has a positive effect on service innovation.

H_4: Knowledge sharing mediates the relationship between business intelligence adoption and service innovation.

H_5: Organizational culture moderates the relationship between business intelligence adoption and service innovation

3. METHODOLOGY

The research was conducted to test the hypothesis of the model and explore the connections between BI adoption and the knowledge sharing, organizational culture, and service innovation within insurance companies that work in Jordan. The research design it used was a quantitative survey research that involved insurance company employees. There are practical and academic reasons as to why the context has been selected (Esra'a et al., 2025). In practice, the insurance industry in Jordan has an important role in the country economy and is in the process of digital transformation (Zureigat et al., 2025). Nonetheless, as discussed, it is an under-innovated area in comparison with global standards, which makes it a convenient area to examine how BI tools can drive the service innovation that is much needed. The sector has 24 insurance companies comprising of life and non-life insurance firms. This is a competitive market that is still expanding. Focusing on a particular industry and a nation will allow reducing external differences (including the regulatory environment) and exploring organizational-level differences in the use of BI, culture, and innovation. Academically, this interest helps answer the demand to study emerging economies and service-oriented studies in the literature on innovation, thus extending the results to the high-tech and Western settings (Anand et al., 2021; Cortes et al., 2021; Wang et al., 2023).

The research design was based on the cross-sectional survey. The data were gathered through electronic (email) questionnaire to the employees with Jordanian insurance companies. The study was conducted among people familiar with the usage of BI and innovation activities in their firm; participants were mid- and senior-level managers of departments (IT, Business Development, Operations, Marketing, and Product Development) and analysts and underwriters

who participated in the data analysis or innovation process. The researcher wanted to get a reliable image of how things are practiced in the organization and reduce the biases of having a single respondent who may overstate facts, therefore the objective of the study was to select more than one respondent in an organization.

In October-November 2024, 400 invitations to complete the survey were sent out. The research was conducted by contacting the industry association and the working contacts, and most of the 24 insurance companies were represented. The number of questionnaires that were sent out and responded to was 245 out of 400. Following completeness and straight-lining screening (removing responses with too much missing data or invariant response) the researchers were left with 223 valid responses, which was a response rate of approximately 55.8. The sample is made up of these 223 responses. The sample size is more than the minimum sufficient in our analytical method (SEM) due to the complexity of the model. Participants were all guaranteed confidentiality as the survey was anonymous to help participants be frank especially concerning organization culture. The research also conducted the single-factor test post hoc created by Harman to test the presence of common method bias as data on the predictor and outcome variables were collected amongst the same respondents. The test did not show any one dominant factor, the biggest factor captured nearly 32 percent of the variance, which implied that the issue of common method bias was not critical.

The survey tool was tailored to measure four primary constructs (business intelligence adoption, knowledge sharing, organizational culture, and service innovation). All constructs were operationalized as perceptual, multi-item measures on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), derived and adapted from previously validated scales in the literature (with wording tailored to the insurance context as needed). Table 1 summarizes the constructs, number of items, and an example item for each scale.

Table 1. Constructs, Definitions, and Measurement Overview

Construct	Definition / Focus	Items	Sample Item
BI Adoption	Extent of use of BI tools/systems for decision support and analytics in the organization (adapted from IT adoption and analytics capability scales)	7	"Our company extensively uses business intelligence applications (reports, dashboards, data analysis tools) to support decision-making."
Knowledge Sharing	Degree of knowledge exchange among employees – how freely and effectively staff share information, ideas, and expertise with colleagues (adapted from knowledge sharing behavior scales)	11	"Employees in our company readily share new ideas or insights that can help others in developing or improving services."
Organizational Culture	Organizational values and norms regarding innovation and collaboration; focusing on how supportive the culture is of change, learning, and knowledge sharing (adapted from organizational culture assessment instruments, emphasizing innovation-supportive traits)	10	"Our organizational culture encourages trying new approaches and supports taking initiative to improve services."
Service Innovation	The capability and tendency of the firm to introduce new or improved services, processes, or customer experience enhancements (adapted from service innovation performance scales)	8	"In the past few years, we have frequently launched or piloted new insurance services or significant improvements to existing services."

Source: Adapted by the authors from established measurement scales

4. RESULTS

This study tested the hypotheses using PLS-SEM through SmartPLS since this approach is appropriate for prediction and model-building exercises, especially those involving mediation and moderation, as well as for smaller samples without the need for normality assumptions. The model designated BI Adoption as the exogenous construct, Service Innovation as the endogenous construct, Knowledge Sharing as a mediator, and Organizational Culture as a moderator. An interaction term was created to represent the moderating effect. As shown in Figure (1) and table (2s) outer loadings were used to assess the strength of the association between observed indicators and their latent constructs, with 0.70 as the target and 0.60 as the minimum threshold, provided the construct reliability and the AVE were sufficiently robust. In this regard, the items with loadings less than 0.60 were removed to enhance the reliability, validity, and overall quality of the measurement model. These items are KS6 Knowledge Sharing, OC3 Organizational Culture, and SI5 Service Innovation.

Table 2. Factor loading

Construct	Item	Factor loading
Business Intelligence	BI1	0.760
	BI2	0.691
	BI3	0.719
	BI4	0.679
	BI5	0.691
	BI6	0.690
	BI7	0.700
Knowledge Sharing	KS1	0.690
	KS2	0.849
	KS3	0.753
	KS4	0.828
	KS5	0.827
	KS6	~~0.546~~
Organizational Culture	OC1	0.674
	OC2	0.649
	OC3	~~0.451~~
	OC4	0.688
	OC5	0.796
	OC6	0.748
	OC7	0.739
Service Innovation	SI1	0.774
	SI2	0.762
	SI3	0.792
	SI4	0.804
	SI5	~~0.599~~

Source: Author's own calculations from SmartPLS output

Figure 1. Evaluation of measurement model

Source: Author's analysis using partial least squares structural equation modeling (PLS-SEM)

The reliability and validity of the measurement model were assessed using Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE). In table (3) all constructs demonstrated acceptable internal consistency, with Cronbach's Alpha and Composite Reliability values exceeding the commonly accepted threshold of 0.70, indicating good reliability (Hair et al., 2019). The rho_A values further confirmed the consistency of the constructs. Although the AVE values for Business Intelligence (0.497) were slightly below the ideal threshold of 0.50, they are still acceptable given that their composite reliability values were above 0.70. As supported by Fornell and Larcker (1981), AVE values above 0.40 can be considered acceptable when Composite Reliability is strong. Therefore, the measurement model demonstrates adequate reliability and convergent validity.

Table 3. The reliability and validity of the measurement

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Business Intelligence	0.831	0.833	0.873	0.497
Knowledge Sharing	0.845	0.862	0.887	0.572
Organizational Culture	0.806	0.813	0.859	0.514
Service Innovation	0.801	0.799	0.864	0.563

Source: Author's own calculations from SmartPLS output.

Discriminant validity was assessed using the Fornell-Larcker criterion, which states that a construct's square root of Average Variance Extracted (AVE) should be greater than its correlations with other constructs in the model. In the correlation matrix provided, the diagonal values represent the square roots of AVE for each construct, and they are all higher than the off-diagonal correlations. For example, the square root of AVE for Service Innovation is 0.812, which is greater than its correlations with Business Intelligence (0.657), Knowledge Sharing (0.628), and Organizational Culture (0.475). This pattern is consistent across all constructs, confirming that each construct is

more strongly related to its own indicators than to those of other constructs. Thus, in table (4) the Fornell-Larcker criterion is satisfied, indicating acceptable discriminant validity in the model.

Table 4. Discriminant validity

	Business Intelligence	Knowledge Sharing	Organizational Culture	Service Innovation
Business Intelligence	0.755			
Knowledge Sharing	0.705	0.798		
Organizational Culture	0.495	0.515	0.728	
Service Innovation	0.657	0.628	0.475	0.812

Source: Author's own calculations from SmartPLS output

The final results of the structural model indicate relationships between the variables of the study which are statistically significant. As represented in Table (5) and Figure (2) and overwhelming in verifying role of Business Intelligence (BI) and Knowledge Sharing (KS), Organizational Culture (OC) on Service Innovation (SI). Path analysis suggests that the influence of the Business Intelligence and Knowledge Sharing variables is substantial. This is evident through the path coefficient of 0.755 and t-value records of 27.879 ($p < 0.001$). This depicts that BI contribute positively in the knowledge exchange and collaborative endeavors of the company/organization. Furthermore, Business Intelligence also positively impacts Service Innovation (p (0.001) t (5.207) 0.389). This shows that the organization is concerned in the practices that are undertaken to promote and improve the innovation in their services.

Moreover, the role of Knowledge Sharing in the relationship with Business Intelligence and Service Innovation also demonstrates that Knowledge Sharing positively impacts Service Innovation (p (0.001) t (3.251) 0.257) proving its role as a mediator. also proves that Knowledge Sharing within the organization impact positively the BI on the innovation outcome as the Business Intelligence influence on Service Innovation through Knowledge Sharing (p (0.001) t (3.452) 0.190) proves that positively contribute to the outcome.

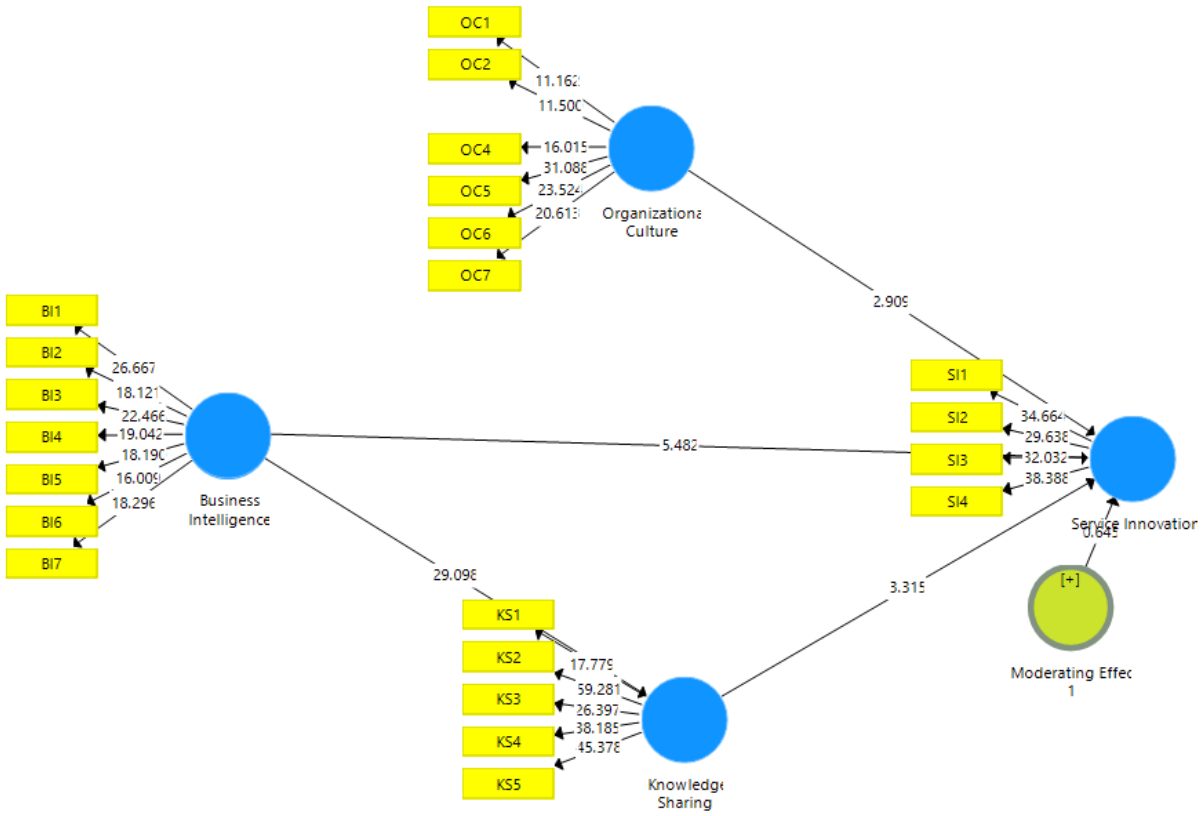
On the other hand, the moderating effect of Organizational Culture on the association of Business Intelligence and Service Innovation was found to be statistically non-significant ($\beta = 0.026$, $t = 0.673$, $p = 0.501$). This means that Organizational Culture does not meaningfully change or enhance the association between these variables. Therefore, Organizational Culture's moderation effect on Business Intelligence and Knowledge Sharing as Service Innovation drivers is almost absent. In essence, the findings emphasize that the Business Intelligence is utilized and Knowledge Sharing is practiced, positively correlates with the level of Service Innovation. The Organizational Culture moderating these variables does not significantly change the situation.

Table 5. Path coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	
Business Intelligence -> Service Innovation	0.389	0.392	0.075	5.207	H1	0.000
Business Intelligence -> Knowledge Sharing	0.755	0.756	0.027	27.879	H2	0.000
Knowledge Sharing -> Service Innovation	0.257	0.254	0.079	3.251	H3	0.001
Business Intelligence -> Knowledge Sharing -> Service Innovation	0.190	0.188	0.055	3.452	H4	0.001
Moderating Effect 1 -> Service Innovation	0.026	0.027	0.039	0.673	H5	0.501

Source: Author's own calculations from SmartPLS output.

Figure 2. Evaluation Structural Model



Source: Author's analysis using partial least squares structural equation modeling (PLS-SEM)

5. DISCUSSION

This study set out with the primary objective of understanding how business intelligence adoption influences service innovation in insurance companies, particularly in an emerging economy context (Jordan). Another objective of the study was to determine whether knowledge sharing is a mediating variable and whether culture in the organization is a moderating variable. The findings are mostly in line with the theoretical study projections on the direct and mediated relationship, but an unexpected finding is on the moderating effect of the culture. As the results indicate, the adoption of BI serves as a crucial facilitator of service innovation (H1) because it confirms the opinion that high levels of data analytics can support service companies to generate and execute new ideas. This conclusion is in line with many empirical researches and supports theories such as RBV and dynamic capabilities in an insurance environment. In their turn, our result resembles that, reported by Alsaad et al. (2022), which indicated that BI positively impacts the performance of new services in Middle Eastern companies, implying that the service innovation is facilitated by BI-induced agility. It also builds upon the conclusions of Aljehani et al. (2024) by directly demonstrating the increase in innovation (not only performance) of BI adoption. In this way, the results can contribute to the literature because they illustrate that data-driven approaches become a major source of innovation even in a more conservative industry.

Another finding of the study was that there is increased knowledge sharing within the organization following the adoption of BI (H2). This adds empirical evidence on the synergy between technology and knowledge management that has been said to be present. It means that, as insurance companies adopt the BI tools, the employees will probably be more interested in the

data and insights discussion, which breaks the departmental silos. Such a result is consistent with Kusmantini et al. (2021) who found that BI enabled knowledge flows within the context of the Indonesian business and with Abusweilem and Abualoush (2019) who highlighted the idea that BI and knowledge processes have a positive impact on organizational performance. The added value here is that the value of BI to the organization is partially its social impact, which establishes a shared language and platform (data) around which people gather and with which they exchange information. This finding has implications to the implementation strategies of BI and knowledge management practice that indicate that managers need to use BI rollouts as an opportunity to also facilitate more open information-sharing cultures.

Moreover, the high positive correlation between knowledge sharing and service innovation (H3) in our study adds importance to the critical role of collaborative knowledge behaviors in service innovation. The outcome is not much of a surprise to the researchers however, our data do give a tangible verification in the insurance industry, of an upcoming market. It echoes the statement by Castaneda and Cuellar (2020) on the premise that knowledge sharing is the baseline of innovation. It is also reminiscent of service results in service libraries and telecommunication companies that have found that an effective internal knowledge transfer results in creative service enhancements. By validating this relationship, the study reinforces knowledge-based theories of innovation. The study extends these theories to insurance organizations, which rely heavily on tacit knowledge (e.g., underwriting experience, customer relationship insights); sharing such knowledge is essential for crafting innovative insurance solutions.

The findings reveal that the organizational culture did not significantly mediate the relationship between the BI adoption and service innovation which implies that the impact of BI on innovation is not affected by organizational culture in the context of Jordanian insurance firms. This result is not consistent with the theoretical assumptions made with regard to the interactionist perspective and organizational fit models that suggest the effectiveness of technology relies on the supportive cultural environments (Wiese et al., 2024; Chen et al., 2018). One of the possible reasons is institutional and contextual peculiarities of the insurance industry. In Jordan, the insurance companies are faced with a very controlled and compliance-based environment in which the decision-making process is formalized, and the initiatives of innovations are usually run within the frames of clear procedures and legal regulations. The impact of cultural difference can be restricted by such institutional rigidity, since the behavior of the employees and the use of technology are predetermined by the rules and standardized procedures rather than by the value systems. Also, insurance companies are more likely to have hierarchical and conservative forms, restricting the demonstration of such cultural characteristics as openness or experimentation that generally enhance innovativeness. Here, BI adoption may be done to ensure operational efficiency and compliance reporting and not creative exploration, which reduces the ability of culture to moderate its results. Moreover, the relatively homogeneous professional norms of the sector, which are focused on accuracy, reliability, and risk control, may cause the cultural convergence of organizations and make the differences in cultural impact less. Also, the possibility also exists that culture works more indirectly and impacts innovation by influencing the knowledge-sharing practices instead of directly interacting with BI adoption. This interpretation is consistent with Lee et al. (2023) who found that supportive cultures are particular to innovation through the improvement in the flow of knowledge within the organization. This way, within highly controlled service industries, such as insurance, BI can be sensitive to structural and institutional conditions to the point that cultural differences are subordinate, and the effects of BI on service innovation rely on technological integration and knowledge-sharing relationships rather than cultural orientation.

One of the theoretical implications of the above three findings (H1–H3) is the importance of

an integrative approach: technological resources (like BI) and human processes (like knowledge sharing) are complementary in fostering innovation. It is in this integrative view where the mediation hypothesis (H4) is applicable. The fact that BI-innovation relationship is mediated by knowledge sharing is an important theoretical finding. It empirically confirms a route proposed in the conceptual literature: BI tools enhance the innovation outcomes in significant part by increasing the knowledge dynamics within an organization. This subtle insight is congruent to the mediated model proposed by Shabbir and Gardezi (2020) in a similar environment and establishes that knowledge sharing is a not only independent variable but also a channel of the advantages of technology. Theoretically, this article adds to the socio-technical systems perspective and dynamic capability perspective because it demonstrates that sensing capability of a firm (BI that capture data) should be coupled with its knowledge transformation capability (shared and recombined knowledge) to provide a new service development capability (innovation). This paper, thus, offers evidence of a stratified approach to the generation of innovation.

Another theoretical perspective is that in relatively traditional sectors like insurance, the range of cultural variation might be narrow, or external pressures (market/regulatory) might dominate the innovation process more than internal culture. This aligns with contingency theory: certain contingencies (external forces) could overwhelm internal culture effects. The result challenges the blanket assumption that "culture always matters" for innovation technology synergy. It may lead theorists to refine under what conditions culture moderates tech–innovation links. Perhaps culture is a stronger moderator in more dynamic tech industries or in more culturally heterogeneous samples. In stable industries, even a less innovative culture might still implement useful innovations when faced with competitive necessity and given the tool (BI), essentially doing what is needed to survive, culture aside. This analysis builds on the RBV and the KBV by demonstrating that BI is a strategic resource whose value can be realised through knowledge sharing as opposed to technology per se. According to RBV, BI increases the dynamic capabilities of a firm; in this case perceiving and taking advantage of service innovation opportunity. According to the KBV point of view, the results place an emphasis on knowledge sharing as the most critical mechanism that converts BI-generated data into innovative results. In the Jordanian setting, the findings highlight that the success of BI is based on a positive organizational culture that builds on openness and teamwork. Therefore, the research adds value to both RBV and KBV in the context of developing economies by connecting technology capabilities as well as social mechanisms that facilitated innovation.

The findings of this research can offer useful advice to the managers of insurance companies that aim to enhance service innovation by using BI and sharing knowledge. BI must be viewed as a strategic ability and not a technological instrument, and its knowledge must be integrated into the everyday decision-making activities of departments. The incorporation of BI dashboards and analytics in customer service, claims management, and product development will help the managers to detect new trends in the market and develop innovative insurance strategies. Another factor that has been proven important is the development of a robust knowledge-sharing culture to help employees share knowledge gained out of BI systems. It can be done by using internal communication systems, cross-departmental working systems, and rewardation systems that appreciate group learning and innovation. Besides that, the leaders are to promote an organizational culture where transparency, trust, and experimentation exist to make employees be inspired to use BI outputs to their advantage. This can be reinforced through frequent training sessions on the interpretation of data and evidence-based decision making. Finally, with the help of matching BI adoption to organizational learning and the aim of innovation, insurance companies will be able to convert data into actionable knowledge, improve the quality of services, and maintain the competitive advantage in the dynamic insurance market.

Similar to any research, this study has constraints that leave open avenues to the future research. This is based on the limitation of causal inference as the cross-sectional design implies, but theoretically, based on grounding theoretical and statistical findings, there are apparent directional relationships; thus, longitudinal studies would assist in capturing how BI adoption and innovation changes over time. Also, as the measures are perceptual and self-reported, any research performed in the future may increase validity with the help of objective measures, e.g. the number of new services being introduced, or the level of customer uptake. The sample study concentrating on the insurance sector of Jordan enhances the contextual control, but reduces the generalizability because cultural or structural forces might not be similar in other industries or national context, and in particular in a culture with a different power distance. The research may be broadened with results of other countries or industries in future to determine the generalizability of the BI-innovation relationship and run longitudinal case-studies to follow the dynamics of knowledge sharing and organization culture in relation to the innovation outcomes. Sub-dimension of knowledge sharing (e.g. do you donate or collect, internal or external sharing) could be explored further and help identify what dimensions contribute to innovation the most. Since the environment has no significant moderating effect of the culture, future research may examine other moderators including analytics climate, learning orientation, or leadership style. Furthermore, a closer look at other mediators such as absorptive capacity, employee competencies, or learning routine would enhance the knowledge of innovation-connecting mechanisms that BI has. Lastly, with the future progress of the insurance sector towards the use of technology that is more advanced, such as artificial intelligence and machine learning, future studies may consider whether such trends are observed to appear, in particular, whether AI-sensitive systems can drive innovation due to the sharing of knowledge and how the organizational preparedness and culture influence such an outcome.

6. CONCLUSION

This research set out to explore the role of business intelligence in enhancing service innovation in insurance companies, with a focus on how knowledge sharing acts as a mediator and organizational culture as a moderator in this relationship. The study found that business intelligence adoption significantly boosts service innovation in insurance firms, confirming that data-driven decision capabilities are a strong driver of new and improved services. More importantly, the research showed that knowledge sharing also mediates this effect, i.e., BI results in improved outcomes of innovation partially because it facilitates and necessitates knowledge and experience sharing among the employees. Business intelligence investments by companies that encourage healthy knowledge sharing are the ones in which the payoff of innovation is highest. On the contrary, we found no strong moderating role of organizational culture on the business intelligence-innovation relationship, which is surprising and indicates that the role of business intelligence on innovation is the same in various cultural settings, at least in our situation. This is a clue that the impact of culture may be indirect (such as via the enabling of knowledge exchange) and not through the direct modification of the immediate effectiveness of business intelligence to enable innovation. The innovation of services in this industry therefore seems to be a product of the interaction of knowledge process and technological resources, and that what a firm does with information is not only as important as the information itself.

This paper can also be considered an addition to academic literature where empirical evidence presented in the form of a little-studied context (the Jordanian insurance sector) can be used to confirm and strengthen existing theories. It helps in developing scholarly knowledge through the combination of the points of views on innovation management, information systems, and organizational theory. It demonstrates the practical application of such theories as RBV and

KBV in an expanding sector of the market, which enables to prove that the distribution of knowledge contributes to the conversion of resources, depending on the business intelligence, into new services. It further gives rise to an inquisitive perception of the role of organizational culture on technology-based innovation. Actionable implications of the research are important to practitioners: the research indicates the need to invest in business intelligence and analytics and at the same time to create an open, knowledge-sharing work environment, so that the innovation potential of business intelligence can be realized. We also urge insurance executives to promote cross-pollination of ideas and data-driven experimentation that have proven to be a productive service innovation source. These insights can be used by policy-makers and industry organizations to promote digital innovation projects and co-educational learning platforms within the insurance industry.

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