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**ORIGINAL**

# Integration of AI Technologies and Knowledge Management Enhances Business Process Efficiency and Competitive Advantage

## La integración de las tecnologías de IA y la gestión del conocimiento mejora la eficiencia de los procesos empresariales y la ventaja competitiva

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## ABSTRACT

The integration of Artificial Intelligence (AI) and Knowledge Management (KM) structures have emerged as a powerful strategy to streamline business processes and gain a competitive edge. The primary objective is to examine how the integration of AI and KM improves business efficiency, fosters innovation, and enhances competitive advantage across various industries, providing insights into the measurable benefits. Key variables include the level of AI integration, knowledge management (KM) effectiveness, business process efficiency, competitive advantage, and employee satisfaction. These factors were measured using standardized scales to determine their interrelations and impact on business performance. Data was collected using surveys from 750 employees across 10 companies, alongside 15 interviews with senior managers. SPSS was used to analyze quantitative data. SPSS was also used for correlation, regression, and descriptive statistics of key variables. There are strong positive correlations between business process efficiency and AI integration level (0,64) as well as between competitive advantage and KM effectiveness (0,67), and the results show that all variables have high mean scores, with business process efficiency having the highest mean (4,22) and employee satisfaction having the lowest (3,98). The investigation concludes that integrating AI technologies with KM systems significantly improves business process efficiency and provides a competitive edge. Organizations should prioritize these integrations to stay competitive, though challenges such as resistance to change must be managed.

**Keywords:** Business Process Efficiency; Knowledge Management; Innovation; Artificial Intelligence.

## RESUMEN

La integración de las estructuras de Inteligencia Artificial (IA) y Gestión del Conocimiento (GC) se ha revelado

como una poderosa estrategia para agilizar los procesos empresariales y obtener una ventaja competitiva. El objetivo principal es examinar cómo la integración de la IA y la GC mejora la eficiencia empresarial, fomenta la innovación y aumenta la ventaja competitiva en diversos sectores, proporcionando información sobre los beneficios cuantificables. Las variables clave incluyen el nivel de integración de la IA, la eficacia de la gestión del conocimiento (GC), la eficiencia de los procesos empresariales, la ventaja competitiva y la satisfacción de los empleados. Estos factores se midieron utilizando escalas estandarizadas para determinar sus interrelaciones y su impacto en el rendimiento empresarial. Los datos se recopilaron mediante encuestas a 750 empleados de 10 empresas y 15 entrevistas a altos directivos. Para analizar los datos cuantitativos se utilizó SPSS. También se utilizó SPSS para la correlación, regresión y estadística descriptiva de las variables clave. Existen fuertes correlaciones positivas entre la eficiencia de los procesos empresariales y el nivel de integración de la IA (0,64), así como entre la ventaja competitiva y la eficacia de la GC (0,67), y los resultados muestran que todas las variables tienen puntuaciones medias elevadas, siendo la eficiencia de los procesos empresariales la que tiene la media más alta (4,22) y la satisfacción de los empleados la más baja (3,98). La investigación concluye que la integración de las tecnologías de IA con los sistemas de GC mejora significativamente la eficiencia de los procesos empresariales y proporciona una ventaja competitiva. Las organizaciones deben dar prioridad a estas integraciones para seguir siendo competitivas, aunque hay que gestionar retos como la resistencia al cambio.

**Palabras clave:** Eficiencia de los Procesos Empresariales; Gestión del Conocimiento; Innovación; Inteligencia Artificial.

## INTRODUCTION

Business Process Efficiency describes how well a company minimizes waste, lowers expenses, increases speed, and improves quality in its operations. It ensures that processes generate the greatest amount of output with the least number of resources possible.[1] Higher production, increased profitability, and enhanced customer satisfaction are all results of efficient operations. The BPE is divided into various categories. Manufacturing and the delivery of services are the main objectives of Operational Efficiency (OE). Managing budgets, cutting expenses, and enhancing financial operations are all part of Financial Efficiency (FE). The goal of Customer Service Efficiency (CSE) is to improve customer satisfaction and response time.

Effective Supply Chain Efficiency (SCE) ensures seamless coordination of suppliers, logistics, and inventory. Administrative Efficiency (AE) streamlines internal processes, such as approvals and documentation. However, there are challenges to achieving efficiency. Common challenges include manual procedures, poor collaboration, redundant tasks, and a lack of process visibility. Often, firms are unable to implement more efficient methods due to outdated processes and opposition to change.[2] Furthermore, it is challenging to identify and address inefficiencies generated by data silos, and the lack of real-time monitoring. Inconsistent performance measures are another issue that many firms face, which makes assessing success challenging. Enhancing communication, integrating contemporary technologies, and conducting ongoing evaluations are all necessary to increase process efficiency.[3]

Organizations hoping to stay responsive and competitive in today's fast-paced commercial world must overcome these challenges. The competitive advantage represents the particular qualities and skills that enable a company to surpass its competition. It makes it possible for a company to provide clients with more value, whether through reduced expenses, improved products, innovation, or outstanding service. Advanced technology, a highly qualified workforce, a solid reputation for the brand, effective procedures, and access to important data or resources are all important sources of competitive advantage.[4] Utilizing Artificial Intelligence (AI) and good Knowledge Management (KM) in the current digital era greatly improves competitive positioning through better decision-making, operational effectiveness, and customer experiences. It takes constant innovation and strategic planning, with the capacity to quickly adapt to market changes to maintain a competitive advantage. KM and AI technology integration offers a potent means of gaining and maintaining a competitive edge.[5] While KM makes sure that important information is effectively gathered, arranged, and disseminated, AI facilitates quicker decision-making, process automation, tailored customer experiences, and predictive insights. When combined, they increase responsiveness, lower operating costs, and foster creativity.[6]

Businesses are positioned to take the lead in a knowledge-based, technology-driven competitive climate in this integration. The research analyzed how AI improves KM [7] in many roles and organizational dimensions. It analyzed the function of AI in KM procedures and proposed methods for combining AI and human expertise across people, processes, and infrastructure. AI increased KM efficiency by facilitating knowledge production in various corporate contexts (35 %), retrieval (42 %), sharing (30 %), and application (40 %). Empirical research is currently needed to evaluate the long-term impacts of human-AI collaboration in knowledge processes, specifically when integrating AI with KM. The research investigated the Knowledge Sharing (KS) facilitated by AI, improved Global

Talent Management (GTM) at a major Multinational Enterprise (MNE).[8] The research employed qualitative interviews with MNE staff members, combining GTM, AI-mediated social exchange theory, and Knowledge-Based View (KBV) as part of the analytical framework. Among international Information Technology (IT) talent, AI-mediated KS increased commitment (38 %), job satisfaction (45 %), and decreased turnover intentions (40 %).

The effects of AI-mediated GTM on knowledge exchange and individual talent results are not quantitatively validated or compared across industries. The research used comprehensive theoretical frameworks backed by KS, trust, and skills to evaluate the impact of AI-human collaboration on business performance. [9]

A collaborative AI-human performance method was validated using Structural Equation Modelling (SEM) and analysis data from 164 employees United Kingdom (UK). According to KS, trust, and role clarity, AI collaboration greatly increased company performance measures by 37 %. The connection between the AI-human relationship and commercial outcomes, particularly the integration of KBV, Socio-Technical Systems (STS), and Organizational Socialization Framework (OSF) in the creative industries, has not received much empirical attention. The impact of AI-based technology-oriented KM, improvement, and digital governance on the provision of digital services in Smart Cities (SCs) was examined.[10] It evaluated digital governance as a representative and advanced as a mediator using the theory of dispersal of change and KM-based service skills.

Public officials, business owners, and residents in South Korean, Pakistani, Japanese, and Bangladeshi cities were given a standardized questionnaire. 569 participants' data were examined using the Statistical Package for the Social Sciences (SPSS). The outcome showed that KM's impact on digital service delivery was mediated by change, while the collision of innovation on service outcome was moderated by e-governance. The impact of KM on SC e-services is moderated by e-governance and innovation, according to a few empirical studies. This research examines how KM and AI integration enhance competitive advantage, promote innovation, and improve business productivity across a variety of industries, providing insights into measurable benefits.[11,12,13,14,15,16]

## METHOD

This research uses a combined-method approach for gathering data, including surveys and interviews. Standardized questionnaires assessing AI integration level, KM effectiveness, business process efficiency, competitive advantage, and employee satisfaction are distributed to 1500 workers from 10 different firms. 750 workers responded to the questionnaires. 15 senior managers also took part in in-depth interviews to offer qualitative perspectives on the difficulties and experiences of incorporating AI with KM systems. Survey data allows for quantitative analysis with SPSS. This method ensures a thorough comprehension of the effects of KM and AI integration on company performance.

**Inclusion Criteria:**

- Workers employed full-time by companies that have integrated AI technology with KM systems or are in the process of doing so.
- Participants from various industries and functional responsibilities (such as management, operations, and IT) to guarantee wide participation.
- Senior managers and executives in charge of KM and AI implementation projects for qualitative interviews.
- Workers with a minimum of six months of experience in their present organization to ensure familiarity with business technology and processes.
- The readiness to give informed consent and willingly take part in questionnaires and interviews.

**Exclusion Criteria:**

- Interns, contractors, or part-time employees are not directly participating in or conversant with AI and KM systems within their organization.
- Organizations that do not currently use AI or KM technologies would not supply relevant data for the research.
- Inconsistent responses lacking in detail or displaying bias or inattention compromise the quality of the data. Table 1 illustrates the demographics and features of the research population (N =750)

The research sample's demographic profile shows a fairly balanced gender distribution, with 0,6 % preferring not to disclose, 44,7 % being female, and 54,7 % being male. The age categories of 26–35 (34,7 %) and 36–45 (30,7 %) comprise the majority of participants. Bachelor's degrees account for the majority (54,7 %), followed by master's degrees (26,7 %), high school (10,7 %), and doctorates (8,0 %). Technology accounts for the largest percentage of participants (28,0 %), followed by healthcare (21,3 %), finance (18,7 %), manufacturing (17,3 %), and retail (14,7 %). Staff-level positions make up the majority (56,0 %), followed by mid-level and senior management (30,7 % and 13,3 %, respectively). Of those with experience, 37,3 % have five to twenty years, 26,7 % have eleven to twenty years, 20,0 % have fewer than five years, and 16,0 % have more than twenty years.

**Table 1.** Demographics and characteristics of the research population.

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 410 | 54,7 % |
| | Female | 335 | 44,7 % |
| | Prefer not to say | 5 | 0,6 % |
| Age Group | 18-25 | 90 | 12,0 % |
| | 26-35 | 260 | 34,7 % |
| | 36-45 | 230 | 30,7 % |
| | 46-55 | 120 | 16,0 % |
| | 56+ | 50 | 6,6 % |
| Education Level | High School | 80 | 10,7 % |
| | Bachelor's Degree | 410 | 54,7 % |
| | Master's Degree | 200 | 26,7 % |
| | Doctorate | 60 | 8,0 % |
| Industry Sector | Technology | 210 | 28,0 % |
| | Healthcare | 160 | 21,3 % |
| | Finance | 140 | 18,7 % |
| | Manufacturing | 130 | 17,3 % |
| | Retail | 110 | 14,7 % |
| Job Role | Staff-Level | 420 | 56,0 % |
| | Mid-Level management | 230 | 30,7 % |
| | Senior Management | 100 | 13,3 % |
| Years of Experience | 5 years | 150 | 20,0 % |
| | 5-10 years | 280 | 37,3 % |
| | 11-20 years | 200 | 26,7 % |
| | 20 years | 120 | 16,0 % |

### Statistical Analysis

The associations between AI integration, KM effectiveness, business process efficiency, competitive advantage, and employee satisfaction were investigated using statistical analysis such as descriptive statistics, Pearson correlations, and multiple regression analysis utilizing SPSS. Descriptive statistics provide an overview of the distributions of important variables and participant demographics. Correlation analysis identifies the strength and direction of correlations between essential variables, helping to understand their dependency and influence. The impact of AI and KM on business results was assessed using multiple regression analysis. Descriptive statistics also assessed the key variables.

## RESULTS AND DISCUSSION

The objective is to examine how AL and KM integration improve business efficiency, foster innovation, and enhance competitive advantage across various industries, providing insights into measurable benefits. Key variables include AI integration level, KM effectiveness, business process efficiency, competitive advantage, and employee satisfaction. The regression analysis, correlation analysis, and descriptive statistics of important variables were performed using SPSS.

### Descriptive Statistics of Key Variables

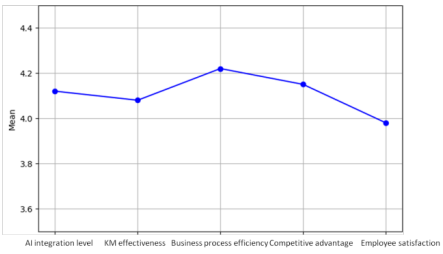


**Figure 1.** Mean scores of key business performance variables.

An overview of the basic features of the data is given by descriptive statistics, which offers direct quantitative insights into the variables under research. Measures like mean, Standard Deviation (SD), minimum, maximum, and range are commonly included in the descriptive statistics of key variables on the integration of AI and KM (figure 1). displays the mean scores of key business performance variables, and table 2. shows the descriptive statistics outcomes.

**Table 2.** Descriptive Statistics of Key Variables.

| Variable | Mean | SD | Min | Max |
|---|---|---|---|---|
| AI Integration Level | 4,12 | 0,76 | 1 | 5 |
| KM Effectiveness | 4,08 | 0,81 | 1 | 5 |
| Business Process Efficiency | 4,22 | 0,69 | 1 | 5 |
| Competitive Advantage | 4,15 | 0,75 | 1 | 5 |
| Employee Satisfaction | 3,98 | 0,88 | 1 | 5 |

Business process efficiency recorded the highest mean (4,22), suggesting that organizations perceive AI as significantly enhancing their operational workflows. Similarly, competitive advantage (4,15) and AI integration level (4,12) were rated highly, indicating a strong alignment between AI adoption and strategic benefits. KM effectiveness (4,08) also reflected a positive influence of AI on organizational learning and data sharing.

Employee satisfaction, while still relatively high at 3,98, showed the greatest variability (SD = 0,88). Overall, these results suggest that AI integration is broadly seen as beneficial across operational and strategic dimensions, though its implications for human factors warrant deeper investigation.

**Correlation Analysis**

The direction and strength of a relationship between two or more variables are determined using a statistical technique known as correlation analysis. Figure 2 depicts the matrix of Pearson correlation.

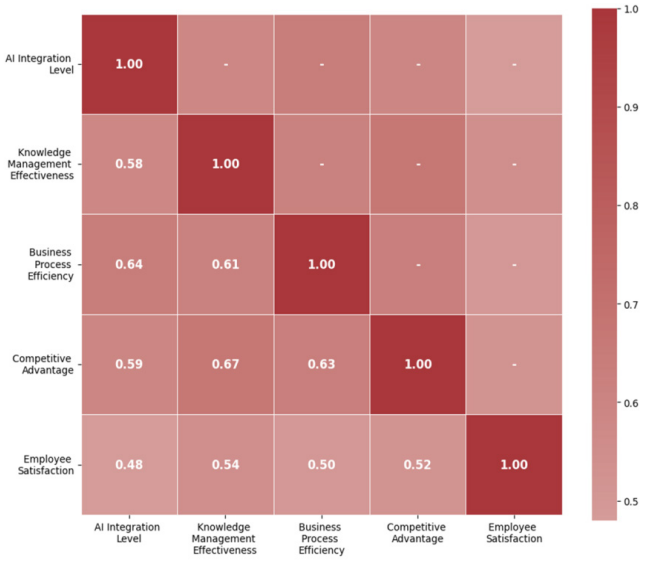


**Figure2.** Pearson Correlation Matrix.

The level of AI integration is strongly correlated with business process efficiency (0,64), and reasonably connected with competitive advantage (0,59), KM effectiveness (0,58), and employee satisfaction (0,48). These findings suggest that greater AI integration is associated with improved business outcomes and increased employee morale. The effectiveness of KM also has a substantial correlation with business process efficiency (0,61) and competitive advantage (0,67), indicating that it plays a crucial role in strategy positioning and performance. Although employee satisfaction is only modestly connected with all other factors, it has the strongest correlation with KM effectiveness (r = 0,54), suggesting that more employee satisfaction is a result of good KM and management.

**Regression Analysis**

Regression analysis is a statistical technique that examines how one or **more predictor variables**

(predictors) and a dependent variable (outcome) are related. Along with determining whether associations exist (as correlation does), it also quantifies their nature and strength, which aids in result prediction and the identification of important influencing elements (table 3). shows the regression analysis predicting business process efficiency.

**Table 3.** Regression analysis predicting business process efficiency.

| Predictor | B | SE | ß | t | p |
|---|---|---|---|---|---|
| AI integration Level | 0,41 | 0,06 | 0,42 | 6,83 | 0,000 |
| KM Effectiveness | 0,36 | 0,05 | 0,38 | 7,20 | 0,000 |
| Employee Satisfaction | 0,22 | 0,07 | 0,21 | 3,14 | 0,002 |
| Constant | 1,25 | 0,42 | - | 2,98 | 0,003 |

Having the greatest standardized beta value (ß = 0,42, p < 0,000), the AI integration level appears to be the most reliable predictor. KM effectiveness comes in second (ß = 0,38, p < 0,000). Employee satisfaction also has a substantial contribution (ß = 0,21, p = 0,002). The unstandardized coefficients for each predictor are positive, suggesting that higher levels of business process efficiency are associated with increases in these variables. The method's constant (B = 1,25, p = 0,003) is similarly significant, indicating that the regression equation is generally robust. These findings highlight how crucial it is to combine AI and KM effectiveness while fostering employee satisfaction to enhance operational performance.

This research investigated how the combination of AI and KM enhances competitive advantage, promotes innovation, and boosts corporate efficiency across various industries, offering insights into quantifiable advantages. The research lacked longitudinal data and cross-industry comparisons, which limited its generalizability and the ability to assess long-term sustainability effects.[17,18] There is a lack of empirical research on combining AI with KM, particularly in assessing the long-term effects of human-AI collaboration in knowledge processes.[7] The effects of AI-mediated GTM on knowledge exchange and individual talent outcomes are not quantitatively validated or compared across industries.[19,20] Additionally, the relationship between AI-human collaboration and business outcomes, particularly the integration of KBV, STS, and OSF in the creative industries, has not received much empirical attention.[21,22,23] Insufficient longitudinal data hindered the study's capacity to track changes over time.[24,25] This research advances knowledge of how business process efficiency and competitive advantage are affected by the combination of AI technology and KM effectiveness, which aids in the development of targeted organizational strategies and improved employee satisfaction techniques.

## CONCLUSION

This research investigated how the integration of AI and KM enhances competitive advantage, encourages innovation, and increases company efficiency across a range of industries, offering insights into quantifiable advantages. The research utilized survey data from 750 employees in 10 companies and 15 senior manager interviews to examine how KM practices and AI technology integration affected business process effectiveness and competitive advantage. Descriptive statistics, correlation, and regression analysis were performed on quantitative data using SPSS. The results supported the development of evidence-based strategies for enhancing employee satisfaction and creativity while also improving organizational performance through AI-KM synergy. Future research should examine the long-term effects, sector-specific modifications, and cultural elements affecting the integration of AI and KM in business efficiency.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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