

-RESEARCH ARTICLE-

GUIDELINES FOR BIG DATA MANAGEMENT: ACHIEVING THE COMPETITIVE ADVANTAGE OF THE INDUSTRIAL BUSINESS SECTOR

Ekalak Sangthong

Faculty of Business Administration,
King Mongkut's University of Technology
North Bangkok, Thailand
Email: s.ekalak@gmail.com (Corresponding Author)

Assistant Professor Dr. Thitirat Thawornsujaritkul

Faculty of Business Administration,
King Mongkut's University of Technology
North Bangkok, Thailand
Email: thitirat.t@fba.kmutnb.ac.th

Professor Dr. Thanin Silpcharu

Faculty of Business Administration,
King Mongkut's University of Technology
North Bangkok, Thailand
Email: thanin.s@fba.kmutnb.ac.th

—Abstract—

The management of big data is crucial for gaining a competitive edge in the digital era. Currently, there is a dearth of effective and efficient guidelines for managing Big Data. This study aims to investigate the guidelines for managing Big Data in order to gain a competitive advantage in the industrial business sector. It will develop a structural equation model through the use of mixed-methodology research. The qualitative research included conducting in-depth interviews with nine experts and organising focus group discussions with 11 qualified experts. A survey was conducted among 500 executives responsible for information management in the industrial business sector, using questionnaires as part of the quantitative research. Descriptive Statistics, Inferential Statistics, and Multivariate Statistics were employed. The research findings

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highlighted the significance of prioritising four key components in order to attain a competitive advantage in the industrial business sector through effective Big data management: 1) Information Management ($\bar{x} = 4.16$) was being the regular evaluation of compliance with the organization's data governance policy, 2) Human Resource and Organization Development ($\bar{x} = 4.09$) was being the design of work systems that encourage employees considering information for decision-making; 3) Innovation and Technology Management ($\bar{x} = 4.08$) was being the creation of Big data analytics models for market research and product development and 4) Alliance Centric ($\bar{x} = 4.02$), was the analysis of market and environment to adjust collaboration plans with business alliances. The results of hypothesis testing indicated that there was no statistically significant difference ($p > 0.05$) in the emphasis on Big data management as a factor contributing to competitive advantage between two groups of industrial businesses, classified by the number of years of registered experience. The analysis of the developed structural equation model (SEM) confirmed its suitability and consistency with the empirical data. The model exhibited satisfactory fit indices, including a chi-square probability level of 0.075, a relative chi-square of 1.163, a goodness of fit index of 0.962, and a root mean square error of approximation of 0.018. The results indicate that the model accurately represents the relationships among the variables being studied.

Keywords: Big data management, Competitive advantage, Industrial business sector

INTRODUCTION

The Economic Growth Rate (YoY GDP)

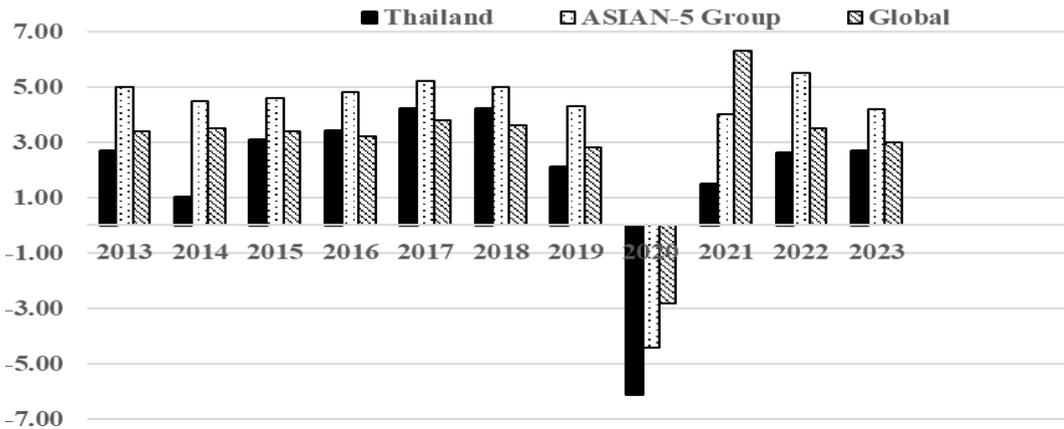


Figure 1: Thailand’s economic growth rate compared to the average of the ASEAN-5 group and the global economic average, 2013 - 2023.

Thailand's current economic system depends on the manufacturing sector's efficiency and product quality. Nevertheless, the Thai economy is confronted with challenges regarding resource utilisation efficiency, which renders it highly susceptible to international economic conditions (Wattanakomo, 2023). The economic growth rate of Thailand is below the average of the ASEAN-5 group and the global economic average, as depicted in Figure 1. As a consequence, Thailand's ability to effectively address global changes is limited. According to the International Institute for Management Development, Thailand's economic competitiveness declined from 25th to 30th out of 64 countries worldwide between 2019 and 2023 (Wattanakomo, 2023). This information is illustrated in Figure 2.

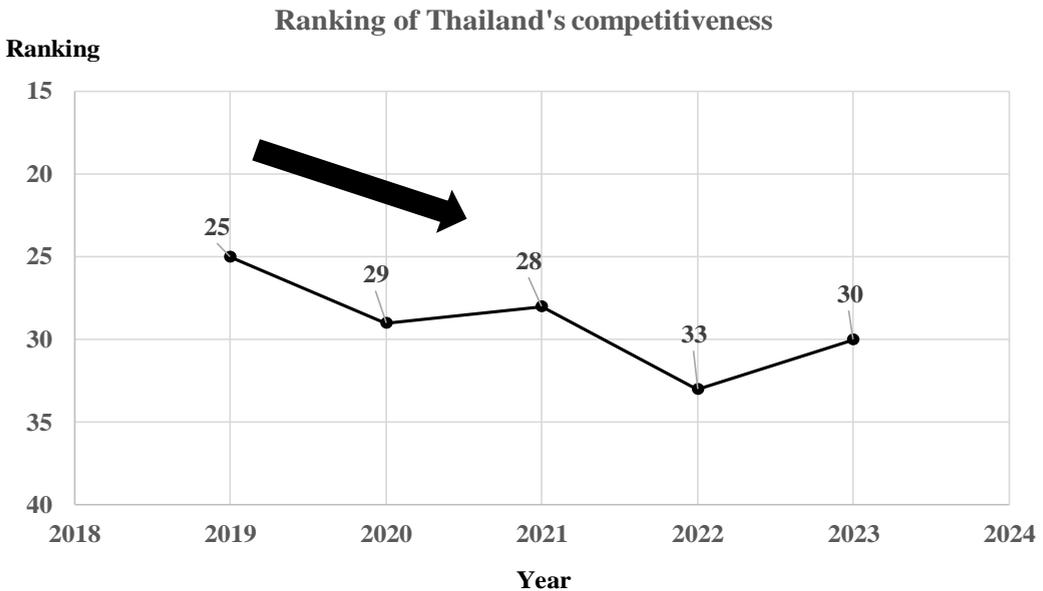


Figure 2: Ranking of Thailand Competitiveness 2019 – 2023

The utilisation of Big data is a significant megatrend that will impact the competitive advantage of industrial businesses. Big data analysis facilitates a comprehensive comprehension of one's business and industry, unveiling customer patterns and market insights, promoting business growth, and distinguishing from competitors. A study was conducted by previous researchers who surveyed more than 900 global business analysts in order to investigate the impact of data on decision-making and business outcomes. The study found a strong link between the implementation of data intelligence practices and financial performance. Organisations that used data intelligence were 58% more likely to exceed their revenue targets compared to those that did not use such practices. This research aims to investigate strategies for leveraging Big data to achieve a competitive advantage in the industrial sector. The growth rate of Big data application in the business sector has been declining due to a shortage of data

analysis experts, a lack of knowledge and understanding of Big data, a failure to recognise its benefits, and the high costs of Big data projects. This involves generating profit and enhancing business value, addressing the expected rise in competition by improving productivity and expanding product offerings to meet evolving customer demands, and establishing long-term resilience in the industrial sector.

RESEARCH OBJECTIVES

To study the components of guidelines of Big data management to achieve the competitive advantage of the industrial business sector.

To develop a structural equation model for guidelines of Big data management to achieve the competitive advantage of the industrial business sector.

LITERATURE REVIEW

Big data refers to large-scale datasets that contain vast quantities of information and exhibit rapid growth and diverse formats. Big data is commonly used in business management for marketing decision-making, risk management, and product development, both online and offline. Big data is experiencing rapid growth in the digital age and encompasses a wide variety of information that is generated and collected at an accelerated pace. The analysis of big data allows businesses to uncover new relationships between actual behaviours and variables. Big data management involves the adoption of effective strategies to gain a competitive edge in the industrial sector. Big data management involves the allocation of human resources, policies, and technologies for data collection, storage, and security to ensure the accuracy and quality of big data. The concept of Big Data includes analysing and presenting analysis results, as well as integrating it into strategic planning to gain a competitive advantage for the organisation.

Competitive advantage is the ability to generate greater value than competitors and meet customer satisfaction. [Masroor and Asim \(2019\)](#) discovered that competition, change, and consumer power have influenced the business landscape, forming the basis of strategic management. Businesses can effectively and efficiently utilise their existing resources in a complex and rapidly changing environment. [García-Villaverde et al. \(2017\)](#) found that successful businesses in long-term competition require a thorough comprehension of and effective responsiveness to consumer needs. In the current era, consumer paradigms are rapidly shifting due to globalisation, leading to rapid changes in customer consumption behaviours. [Barney \(2012\)](#) proposed the VRIO analysis as a tool to assess an organization's internal environment, including finance, human resources, materials, and knowledge. The VRIO analysis identifies four essential characteristics for a company's resources to attain a sustainable competitive advantage: value, rarity, costly imitation, and organised value capture.

Information Management encompasses the activities of planning, searching, collecting, storing, maintaining, and transmitting information to facilitate efficient business operations. The organisation employs information technology as a means to improve competitiveness and strives to become data-driven. [Soltani et al. \(2018\)](#) established the significance of customer relationship management in driving business growth in the current era. Utilising technology to analyse customer data for customer orientation can improve organisational capabilities. [Liu et al. \(2020\)](#) found that collaborative approaches across systems necessitate the utilisation of integrated data sources. Big data analysis on Cloud systems enables organisations to gain insights into data relationships and accurately identify customer needs, resulting in the development of products that align with customer demands. The study identified several factors that influence successful information management, including executive support, management processes, personnel competencies, communication, and participation. The guidelines for effective information management encompass strong internal management, personnel skill enhancement, executive support in operational processes, teamwork, and information systems and technology management.

Innovation and Technology Management encompasses the administration of policies, strategies, and plans to promote and align innovation and technology with business objectives. The tasks involved in this process are managing internal knowledge, using suitable technology for problem-solving, and monitoring and evaluating outcomes. [Muanwiharn \(2020\)](#) discovered a direct relationship between market demand and organisational strategies, with the latter influencing technology and innovation. [Uraiwan \(2021\)](#) determined that organisational culture management significantly impacts innovation development in companies listed on the Market for Alternative Investment (MAI). [Somsong \(2021\)](#) determined that organisational success is contingent upon business partnerships and networks that possess distinctive product innovations, which in turn impact competitive advantage. This finding is consistent with [Moghavvemi et al. \(2012\)](#), who observed that innovation plays a crucial role in establishing a substantial competitive advantage.

Alliance Centric refers to the close collaboration between multiple organisations in order to achieve shared business objectives. The study revealed that Organisational Adaptability, Collaboration, Innovation, and Information technology are crucial factors in establishing a competitive advantage for the processed food industry cluster. Specifically, collaboration has a direct impact on information technology. [Suriyo \(2021\)](#) discovered that collaboration has become a powerful strategic tool in different industries and organisational sizes. Collaboration is defined as the coordinated efforts of multiple organisations to address shared challenges and achieve mutually beneficial outcomes. Collaborative networks enable improved innovation, growth, and competitive advantage for all participants by integrating various resources, knowledge, and capabilities. [Katemanee et al. \(2021\)](#) discovered that effective management of networks

involving government, private sector, educational institutions, and communities has a significant impact on various types of innovation (product, process, marketing, and organisational). This, in turn, contributes to the long-term sustainability and competitive advantage of organisations. Organisations that have collaborative networks can utilise support networks to promote innovation, which in turn can improve the competitive advantage of small and medium enterprises (SMEs). According to Paulus (2000), networks play a vital role in the development of innovation, and the ability to manage networks has a positive impact on innovation.

The field of Human Resources and Organisation Development focuses on developing processes to enhance personnel competencies in alignment with organisational development. This includes activities aimed at developing concepts, attitudes, behaviours, knowledge, and work skills. Alfawaire and Atan (2021) identified organisational innovation, knowledge management, and strategic human resource management as key drivers for achieving sustainable competitive advantage. As a result, strategic alliances are formal agreements between two or more organisations to jointly invest and share resources in order to achieve common goals. Organisations should utilise the strengths of their own organisation or business partners to maximise potential and gain a competitive edge. Embracing the idea of strategic alliances to enhance and grow the organisation is crucial in accelerating the path to success.

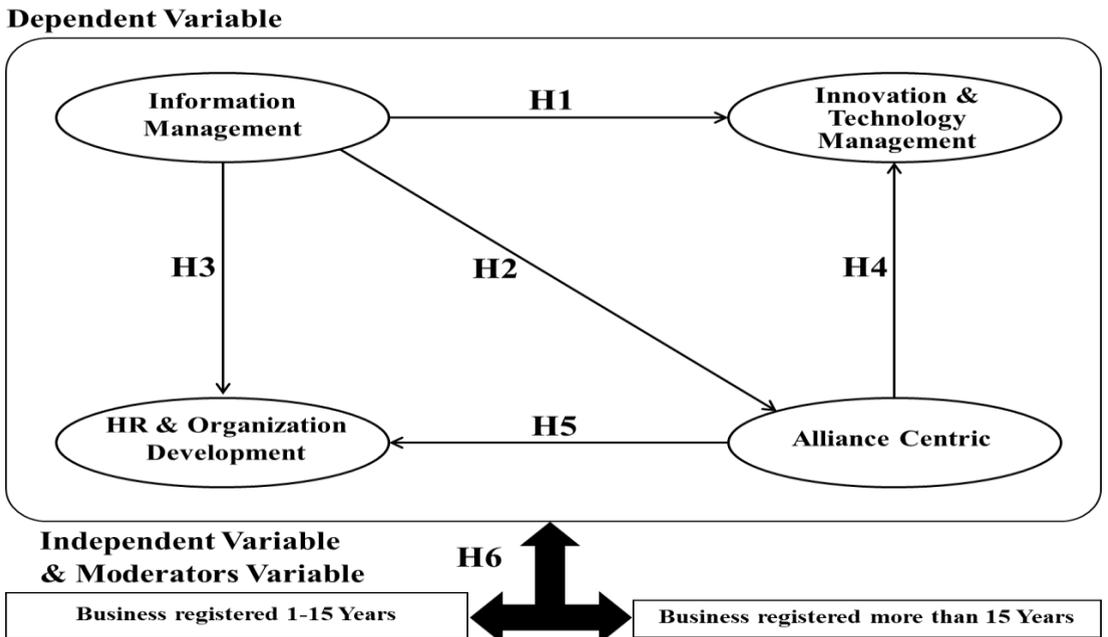


Figure 3: Conceptual Framework for Guidelines of Big Data Management to Competitive Advantage of Industrial Business Sector.

According to the literature review, a conceptual framework can be established to guide the management of Big data in order to gain a competitive advantage in the industrial business sector. This framework consists of four key components: Information Management, Human Resource and Organisation Development, Innovation and Technology Management, and Alliance Centric. [Figure 3](#) illustrates these components.

RESEARCH HYPOTHESES

Based on the research objectives and relevant literature, the researcher formulated six hypotheses:

H1: *Information Management directly influences Innovation and Technology Management (Chan et al., 2019; Masroor & Asim, 2019).*

H2: *Information Management directly influences Alliance Centric (Berisha-Shaqiri, 2015; Hadadi & Almsafir, 2013)*

H3: *Information Management directly influences Human Resource and Organization Development (Moqbel et al., 2013; Pérez-Aróstegui et al., 2015).*

H4: *Alliance Centric directly influences Innovation and Technology Management (Chinfuk et al., 2019).*

H5: *Alliance Centric directly influences Human Resource and Organization Development. (Alfawaire & Atan, 2021; Kale & Singh, 2007)*

H6: *The overall importance of guidelines for Big data management to achieve a competitive advantage in the industrial business sector, when classified by the number of years registered, does not differ (Horng et al., 2022; Venkateswaran et al., 2019).*

RESEARCH METHODOLOGY

This research employs an inductive approach and utilises a mixed-methodology. The study utilised research to generate new knowledge through inductive methods. The study included three components: Qualitative Research involving In-Depth Interviews, Quantitative Research with survey data collection, and Qualitative Research utilising Focus Group Discussions to validate the research model.

Qualitative research using in-depth interviews: The sample for this research included nine experts who were carefully chosen through Purposive Sampling. The experts were divided into three groups: three entrepreneurs or executives from industrial businesses, three representatives from government agencies and relevant organisations, and three individuals from the academic community.

Quantitative Research using Survey Technique: The study population consisted of 890 information management executives responsible for Big data management in businesses listed on the Stock Exchange of Thailand. The sample size was determined by the researcher based on established criteria for research methods such

as Component Analysis or Structural Equation Modelling. These criteria indicated that a sample size of 500 would be highly suitable. The study utilised multi-stage sampling, specifically employing Cluster Sampling. The businesses listed on the Stock Exchange of Thailand were divided into two groups based on their registration years: 1-15 years (447 companies) and over 15 years (443 companies). The study employed a probability sampling method, which included both stratified sampling and simple random sampling techniques.

Qualitative Research using Focus Group Discussions: Eleven experts were selected through Purposive Sampling.

RESULTS

Table 1. Comparison of the importance of Guidelines for Big data management to achieve the competitive advantage of the industrial business sector.

| Guidelines of Big data management to achieve the competitive advantage of the industrial business sector. | Number of years registered 1- 15 years | | | Number of years registered more than 15 years | | | t-value | P-value |
|---|--|------|---------------------|---|------|---------------------|---------|---------|
| | \bar{x} | S.D. | Level of Importance | \bar{x} | S.D. | Level of Importance | | |
| Overall | 4.11 | 0.45 | High | 4.06 | 0.46 | High | 1.02 | 0.31 |
| 1. Information Management | 4.17 | 0.45 | High | 4.14 | 0.46 | High | 0.81 | 0.42 |
| 2. Human Resource and Organization Development | 4.11 | 0.45 | High | 4.06 | 0.44 | High | 1.11 | 0.27 |
| 3. Innovation and Technology Management | 4.11 | 0.54 | High | 4.05 | 0.55 | High | 1.08 | 0.28 |
| 4. Alliance Centric | 4.03 | 0.50 | High | 4.00 | 0.53 | High | 0.80 | 0.43 |

*Statistically significant at the 0.05 level.

The comparison of the importance levels of Big data management for achieving competitive advantage in the industrial business sector, classified by the number of years registered, is presented in Table 1. The overall average importance level was found to be 4.09, indicating a high level of importance. When evaluating each aspect, all aspects were deemed highly significant, with Information Management being the most critical, averaging at 4.16. The t-test results indicate that there is no significant

difference in the importance levels of Big data management guidelines for competitive advantage in the industrial business sector when classified by the number of years registered for the two independent population groups.

The analysis of guidelines for Big data management in the industrial business sector identified four components: Information Management, Human Resource and Organisation Development, Innovation and Technology Management, and Alliance Centric. The statistical values evaluating the model's fit were as follows: p-value = 0.075, CMIN/DF = 1.163, GFI = 0.962, and RMSEA = 0.018. These values were found to be significant at the 0.001 level, aligning with previous research and empirical evidence, and meeting the criteria established by (Arbuckle, 2016). The structural equation model illustrating the guidelines for Big data management to attain a competitive advantage in the industrial business sector is presented in Figure 4.

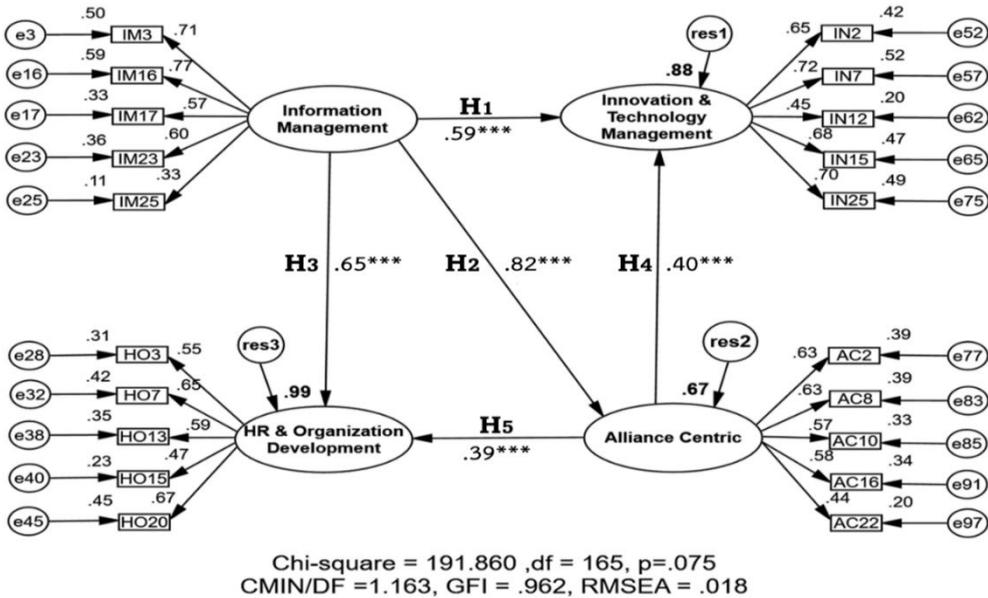


Figure 4: Structural equation model for guidelines of Big data management to achieve the competitive advantage of the industrial business sector.

Figure 4 presents the use of structural equation modelling (SEM) to examine the causal relationships between latent variables related to Big data management guidelines and the attainment of competitive advantage in the industrial business sector. The study tested six hypotheses and found support for all of them:

H1: Information Management directly and significantly influences Innovation and Technology Management at the 0.001 level, with a Standardized Regression Weight of 0.59.

H2: Information Management directly and significantly influences Alliance Centric at

the 0.001 level, with a Standardized Regression Weight of 0.82.

H3: *Information Management directly and significantly influences Human Resource and Organization Development at the 0.001 level, with a Standardized Regression Weight of 0.65.*

H4: *Alliance Centric directly and significantly influences Innovation and Technology Management at the 0.001 level, with a Standardized Regression Weight of 0.40.*

H5: *Alliance Centric directly and significantly influences Human Resource and Organization Development at the 0.001 level, with a Standardized Regression Weight of 0.39.*

H6: *There is no significant difference in the importance levels of guidelines of Big data management to achieve the competitive advantage of the industrial business sector when classified by the number of years registered at the 0.05 level.*

CONCLUSION AND DISCUSSION

The research found no statistically significant difference in the importance of Big data management guidelines for achieving competitive advantage in the industrial business sector, when categorised by the number of years registered. This finding held true for both overall analysis and analysis by specific aspects, at a significance level of 0.05. Businesses registered for 1-15 years and those registered for over 15 years have similar business operations focused on attaining sustainable competitive advantage. The use of information analysis findings in a strategic manner is supported by (Horng et al., 2022), who found that leveraging big data analysis capabilities, developing strategies based on big data insights, and effectively managing knowledge all contribute to improved competitive advantage and performance in sustainable marketing practices. Venkateswaran et al. (2019) also support the idea that social media is utilised by businesses of all types to engage with customers and partners, as well as improve efficiency in human resource management, particularly in recruitment. Hence, information technology facilitates organisational success and global competitiveness.

The results of the hypothesis testing indicate that Information Management significantly influences both Human Resource and Organisation Development, as evidenced by a Standardised Regression Weight of 0.97. This study provides empirical evidence supporting the importance of Information Management in contemporary businesses. It shows that effective Information Management has a significant impact on the development of human resources and organisational efficiency, enabling businesses to adapt to changes and gain a competitive advantage. Prior studies have shown that human resource management information systems (HRMIS) offer essential and extensive information for the purposes of planning and decision-making. According to Pérez-Aróstegui et al. (2015), information technology is crucial for competition across various industries. Its effective implementation necessitates collaboration within the organisation, encompassing human resource development and internal quality

management. According to [Moqbel et al. \(2013\)](#), the utilisation of internal social networks has been shown to improve employee performance, job satisfaction, and organisational interaction, resulting in a more favourable work-life balance and enhanced employee performance.

The results of the hypothesis testing indicate that Information Management has a significant direct influence on Alliance Centric. This variable demonstrated the strongest direct influence, with a standardised regression weight of 0.82. The empirical evidence suggests that organisational information management facilitates the formation of business partnerships, enabling the exchange and sharing of data, resources, and capabilities, thereby enhancing strength and competitiveness. [Dyer and Singh \(1998\)](#) discovered that businesses that engage in collaborative partnerships gain a competitive edge by creating value. The nature of collaboration with business partners evolves through ongoing analysis of the market and changing environments. According to [Hadadi and Almsafir \(2013\)](#), information and the internet have the potential to generate and modify business models for business growth. Similarly, [Berisha-Shaqiri \(2015\)](#) discovered that access to advanced and ongoing information allows businesses to expand their customer base and engage in global partnerships.

The study revealed that Information Management had the highest average importance, with a mean score of 4.16, which was statistically significant. These findings indicate a high level of importance placed on information management by the majority of organisations. The study conducted by [Saeidi et al. \(2019\)](#) revealed a direct relationship between information technology strategies, information technology infrastructure, and competitive advantage. The management of big data requires the establishment of policies and the selection of suitable technologies to ensure the accuracy, security, and quality of the data. Big data management involves a framework of policies, procedures, and technologies for efficiently collecting, storing, organising, and governing large and complex datasets.

The study identified that the most crucial factor for achieving a competitive advantage in the industrial business sector through Big Data management is the establishment of a system for regularly evaluating compliance with the organization's data governance policies, with an average rating of 4.55. It is essential to establish a data governance system and regularly assess compliance with data governance policies. [Mikalef et al. \(2020\)](#) discovered that implementing data governance improves data management regulations, reduces risks such as data duplication, poor data quality, data hoarding, data leakage, and online attacks, and ultimately facilitates the transformation of data into value for the organisation. [Ardagna et al. \(2021\)](#) discovered a direct correlation between a business's capacity for Machine Learning (ML) and Artificial Intelligence (AI) and the challenges associated with analysing data to achieve user objectives, particularly in terms of data accuracy and security. Constructing information analysis systems using

Automation technology necessitates a substantial volume of data for self-enhancement. Data leakage or training AI with an incomplete dataset can result in the system being developed with bias and unfairness. The Management System Certification Institute states that ISO 27001 is a systematic approach for protecting and managing organisational data through risk management. It is based on three key principles: restricting access to authorised individuals, maintaining data integrity, and ensuring the availability of data systems.

SUGGESTIONS

This research provides guidance for businesses seeking to prioritise the development of competitive capabilities through Big Data management in order to attain sustainable competitive advantage. The researcher proposes two guidelines for managing Big Data in order to achieve a competitive advantage in the industrial business sector:

Policy-Level Recommendations

Revising laws or regulations to reduce obstacles in utilising digital technologies for production and service development should be considered by the government and relevant agencies. Secure electronic systems should be developed for various permit applications.

The government and relevant agencies should expedite policies to promote the use of digital technologies for Big data analysis in the industrial business sector, providing tax and non-tax incentives.

Policymakers should develop strategies for digital economic growth by leveraging Big Data management insights to facilitate access to funding opportunities for businesses. Furthermore, it is important to prioritise the acceleration of the development of cybersecurity systems that adhere to international standards.

The government and relevant agencies should establish specialized units for digital workforce development to enhance digital technology skills among unemployed individuals and those in the labor market.

Universities should focus on developing curricula and producing graduates with expertise in big data-related fields. It is recommended to promote the utilisation of big data research derived from digital transactions to inform economic development, research, and innovation.

Operational-Level Recommendations:

Industrial business operators should prioritise information management in three key areas: evaluating compliance with data governance policies, granting employees access

to data based on job levels, and using efficient equipment for managing organisational data.

Industrial business operators should prioritise human resource and organisational development in three key areas: promoting the use of information in decision-making through work system design, analysing internal and external data to enhance human resources and organisational development, and utilising Big data to identify and replace inefficient work processes with modern technology.

Industrial business operators should prioritise innovation and technology management in three areas: Big data Analytics models for market research and product/service development, high-speed internet technology and cloud computing implementation, and utilisation of AI technologies such as Chatbots.

Industrial business operators should focus on business partner relationships in three areas: analysing changing market conditions to adjust collaboration plans, analysing the performance of other organizations for potential mergers and acquisitions (M&A), and establishing collaborations with educational institutions for research and innovation.

Industrial business operators should strategically plan employee development in data analysis skills, encompassing re-skilling, up-skilling, new-skilling, and cross-skilling. Regular assessment of employees' Big data management skills is essential for fostering a data-driven organisational culture.

Collaboration between industrial business operators and higher education institutions is recommended for the development of Big data curricula. This collaboration should also include the provision of internships or projects in the field of Big data to enable students to gain practical experience.

Industrial business operators should allocate adequate budgets for developing organisational information systems, including Big data projects, personnel's digital skill development, and data security measures.

RECOMMENDATIONS FOR FUTURE RESEARCH:

Future research should focus on developing guidelines for enhancing employees' digital skills to optimise the utilisation of Big Data in organisations.

Future research should focus on developing guidelines for data governance management in the industrial business sector.

Future research should focus on developing guidelines for managing big data in the context of business continuity planning (BCP) in the industrial sector.

REFERENCES

- Alfawaire, F., & Atan, T. (2021). The effect of strategic human resource and knowledge management on sustainable competitive advantages at Jordanian universities: The mediating role of organizational innovation. *Sustainability*, 13(15), 8445. <https://doi.org/10.3390/su13158445>
- Arbuckle, J. L. (2016). IBM SPSS Amos 24 User's Guide. [https://www.csun.edu/itr/downloads/docs/IBM SPSS Amos User GuideV24.pdf](https://www.csun.edu/itr/downloads/docs/IBM_SPSS_Amos_User_GuideV24.pdf)
- Ardagna, C. A., Bellandi, V., Damiani, E., Bezzi, M., & Hebert, C. (2021). Big Data Analytics-as-a-Service: Bridging the gap between security experts and data scientists. *Computers & Electrical Engineering*, 93, 107215. <https://doi.org/10.1016/j.compeleceng.2021.107215>
- Barney, J. B. (2012). Purchasing, supply chain management and sustained competitive advantage: The relevance of resource-based theory. *Journal of supply chain management*, 48(2), 3-6. <https://doi.org/10.1111/j.1745-493X.2012.03265.x>
- Berisha-Shaqiri, A. (2015). Business Initiative For Creating Competitive Advantage Through Information Technology. *Challenges of the Knowledge Society*, 988. <https://www.proquest.com/openview/69cb9471aa57f00f7503104bcda75f9f/1?pq-origsite=gscholar&cbl=2036059>
- Chan, C. M., Teoh, S. Y., Yeow, A., & Pan, G. (2019). Agility in responding to disruptive digital innovation: Case study of an SME. *Information Systems Journal*, 29(2), 436-455. <https://doi.org/10.1111/isj.12215>
- Chinfuk, N., Sawatkeaw, N., & Thepvarin, S. (2019). Structural Equation Model of Factors Affecting the Effectiveness of Local Government Organizations in Southern Thailand. *Princess of Naradhiwas University Journal of Humanities and Social Sciences*, 6(2), 73-88. <https://so05.tcithaijo.org/index.php/pnuhuso/article/view/152045>
- Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of management review*, 23(4), 660-679. <https://doi.org/10.5465/amr.1998.1255632>
- García-Villaverde, P. M., Parra-Requena, G., & Ruiz-Ortega, M. J. (2017). From pioneering orientation to new product performance through competitive tactics in SMEs. *BRQ Business Research Quarterly*, 20(4), 275-290. <https://doi.org/10.1016/j.brq.2017.05.002>
- Hadadi, K., & Almsafir, M. K. (2013). The relationship between information technology and marketing. 2013 International Conference on Advanced Computer Science Applications and Technologies, <https://doi.org/10.1109/ACSAT.2013.54>
- Hornig, J.-S., Liu, C.-H., Chou, S.-F., Yu, T.-Y., & Hu, D.-C. (2022). Role of big data capabilities in enhancing competitive advantage and performance in the hospitality sector: Knowledge-based dynamic capabilities view. *Journal of*

Hospitality and Tourism Management, 51, 22-38.
<https://doi.org/10.1016/j.jhtm.2022.02.026>

- Kale, P., & Singh, H. (2007). Building firm capabilities through learning: the role of the alliance learning process in alliance capability and firm-level alliance success. *Strategic management journal*, 28(10), 981-1000.
<https://doi.org/10.1002/smj.616>
- Katemanee, P., Wangbenmud. C., Lalitsasiwimol, W., Chankingthong, K.,. (2021). Utilize Structural Equation Model (SEM) to Explore the Relationship between Network Management and Competitive Advantage: the Mediating Effect of Innovation: the Case Study of Food Processing in the Southern Thailand. *Economics and Business Administration Journal Thaksin University*.
<https://so01.tci-thaijo.org/index.php/ecbatsu/article/view/240357>
- Liu, Y., Soroka, A., Han, L., Jian, J., & Tang, M. (2020). Cloud-based big data analytics for customer insight-driven design innovation in SMEs. *International Journal of Information Management*, 51, 102034.
<https://doi.org/10.1016/j.ijinfomgt.2019.11.002>
- Masroor, N., & Asim, M. (2019). SMEs in the contemporary era of global competition. *Procedia Computer Science*, 158, 632-641.
<https://doi.org/10.1016/j.procs.2019.09.097>
- Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2020). The role of information governance in big data analytics driven innovation. *Information & Management*, 57(7), 103361. <https://doi.org/10.1016/j.im.2020.103361>
- Moghavvemi, S., Mohd Salleh, N. A., Zhao, W., & Mattila, M. (2012). The entrepreneur's perception on information technology innovation adoption: An empirical analysis of the role of precipitating events on usage behavior. *Innovation*, 14(2), 231-246. <https://doi.org/10.5172/impp.2012.14.2.231>
- Moqbel, M., Nevo, S., & Kock, N. (2013). Organizational members' use of social networking sites and job performance: An exploratory study. *Information Technology & People*, 26(3), 240-264. <https://doi.org/10.1108/ITP-10-2012-0110>
- Muanwiharn, J. (2020). Structural Equation Model of Product Design Strategies for Medium and Small Industries in Thailand to Excel in the Global Market. *Princess of Naradhiwas University Journal of Humanities and Social Sciences*, 7(1), 1-13. <https://so05.tci-thaijo.org/index.php/pnuhuso/article/view/186997>
- Paulus, P. (2000). Groups, teams, and creativity: The creative potential of idea-generating groups. *Applied psychology*, 49(2), 237-262.
<https://doi.org/10.1111/1464-0597.00013>
- Pérez-Aróstegui, M. N., Bustinza-Sánchez, F., & Barrales-Molina, V. (2015). Exploring the relationship between information technology competence and quality management. *BRQ Business Research Quarterly*, 18(1), 4-17.
<https://doi.org/10.1016/j.brq.2013.11.003>
- Saeidi, P., Saeidi, S. P., Sofian, S., Saeidi, S. P., Nilashi, M., & Mardani, A. (2019). The

- impact of enterprise risk management on competitive advantage by moderating role of information technology. *Computer standards & interfaces*, 63, 67-82. <https://doi.org/10.1016/j.csi.2018.11.009>
- Soltani, Z., Zareie, B., Milani, F. S., & Navimipour, N. J. (2018). The impact of the customer relationship management on the organization performance. *The Journal of High Technology Management Research*, 29(2), 237-246. <https://doi.org/10.1016/j.hitech.2018.10.001>
- Somsong, P. (2021). The Relationship Between Strategic Leadership Roles, Product Innovation, and Business Partnerships Impacting the Competitive Advantage of Small and Medium Enterprises in the Upper Northern Region. *Journal of Humanities and Social Sciences Thonburi University*, 15(2), 91-102. https://www.thonburi-u.ac.th/Journal/Document/15-2/Journal15_2_8.pdf
- Suriyo, O. (2021). Guidelines Of Industrial Business Development By Good Governance Principles For Sustainable Growth. *Academy of Strategic Management Journal*, 20(2). <https://fba.kmutnb.ac.th/main/wp-content/uploads/2022/06/Guidelines-of-Industrial362565.pdf>
- Uraiwan, T., Toopgrajank, S., & Charoenwiriyaikul, C. (2021). Innovation Development of MAI-Listed Companies. *Journal of Buddhist Anthropology*. <https://so04.tci-thaijo.org/index.php/JSBA/article/view/247852>
- Venkateswaran, R., Ugalde, B., & Gutierrez, R. T. (2019). Impact of social media application in business organizations. *International Journal of Computer Applications*, 975(8887), 5-10. <https://www.researchgate.net/profile/Bernard-Ugalde/publication/334522925>
- Wattanakomo, S. (2023). Business Operation Strategies In Epidemics of Emerging Diseases. *Kurdish Studies*, 11(2), 2318-2330. <https://kurdishstudies.net/menu-script/index.php/KS/article/view/797>