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The organizational learning capability as an antecedent to the implementation of Big data Analytics: Some evidence from an Asian country

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Abstract

This study aims to investigate the relationship between an organization's capacity for learning and its use of big data analytics in an Asian nation. Using a quantitative research design, the investigation collects data from a number of local companies. According to the findings, the deployment of big data analytics is positively correlated with an organization's capacity to learn. This indicates that in order to implement these technologies effectively, a culture of learning must be established. Some qualities of an organization's learning capability, such as knowledge transfer and experimentation, have a stronger correlation with the usage of big data analytics than others, according to the study. The findings have implications for regional managers and policymakers and underline the need of investing in the development of organizational learning capability to improve the use of big data analytics. This study greatly contributes to our understanding of the function of organizational learning capability as a prerequisite for the deployment of big data analytics in the context of an Asian country through its findings. In order to maximize the use and impact of big data analytics, the findings imply that businesses may benefit from a strategic approach to organizational learning.

Keywords: organizational learning capability, antecedent, big data Analytics.

BACKGROUND

In recent years, Big Data Analytics and Big Data are emerging trends that have spread across the globe. The data analysis becomes easy using Big data analytics in time through the use of machine-to-machine algorithms for decision making. The ability of traditional technologies and applications is challenged by big data in data analysis and management (Chen et al.,2019). The imagination of humans is also challenged by big data (Awan et al.,2021). Big data can be regarded as a few dozen terabytes by some researchers, but it is not just like this. Big data comprise a large dataset, which can be stored and managed in a local NAS (network-attached storage) or SAN (storage area network) through the use of a disk array. Thus, big data can be perceived as petabytes size, which needs a complicated distributed storage and computing grid along with suitable tools and applications for managing it.

In the field of organizational management, organizational learning has become a key concept. It has received much attention from researchers working on organizational

aspects. In information and technology management systems, organizational learning has become a key concern (Bag et al.,2020). It has been found by some studies that there is a direct influence created by organizational learning on the use of an ERP system, while an indirect influence on the satisfaction of users (Behl,2021). The significance of training has been acknowledged by some researchers before the implementation of new technology or a system (Mikalef, et al.,2019). An organizational learning curve has been presented by the adoption of any technology. In literature, studies have overlooked the dimensions of OLC. The concept of organizational learning has been neglected because of several reasons for the adoption of an information system. The overuse of TAM is the first and foremost reason for explaining the use of the system. The second is the lack of tools for measuring organizational learning (Rialti et al.,2020). The concept of the organizational learning curve has been established in the following section.

Big data refers to the massive dataset in terms of variety, volume, velocity, which challenges the existing landscape of technology. The storage of big and diverse data is not a challenge, but to transform the unstructured data into information for decision making and taking action. Important prospects can be delivered by big data for effective decision-making. Similarly, a conceptual framework was proposed by Lin and Kunnathur (2019) to define the concept of big data in higher education using three components. The first component is the use of a framework for describing, the second is linking data systems for organizing existing data, and the third is the development of a research design for framing a set of investigation approaches (Mantok et al.,2019). It was mentioned by Annarelli et al. (2021) that aspects other than storage are challenged by big data that include governance, management, and analytics of data. A massive data volume is generated by organizations nowadays because of new technologies and systems, which allow the collection of huge logs, trackers, sensor information, datasets, etc. A big source of big data is social media. A single user can generate gigabytes of data every month through sharing videos and photos, sending thousands of messages, and content sharing with other users.

LITERATURE REVIEW

Conceptual Framework

According to Ferreira et al. (2021), big data can be defined by value, velocity, variety, and volume. Large amounts of structured, as well as unstructured data, are generated by the latest IT devices, corporate information systems, and social media services. Challenges are being faced by business organizations in capitalizing and managing data for achieving competitive advantage. A company can adopt big data analytics, which comprises techniques and technologies for analyzing complex and large-scale data for different applications to improve organizational performance in different aspects. The advanced technologies include data mining tools. A study was conducted by Ciampi, et al. (2021) and it was found that big data analytics include visual technologies, analysis capability, and storage and managed of high-tech data (Anand et al.,2021). It was found by Mikalef, et al. (2020) in his studies that big data can be considered as a process and entity. As an entity, it includes the volume of information, which cannot be processed through the use of traditional software approaches and databases. It is collected from various sources, i.e., internal and external. Typically, big data includes structured information that is organization information acquired from spreadsheets, relational databases, and machines. Unstructured data is not available in a single place. It is a sort

of dynamic information. The elements of data are captured by semi-structured data, as it does not remain in fixed fields such as HTML and XML tagged.

Big data relates to technologies and infrastructure for the collection, storage, and analysis of different data types (Mikalef, et al.,2021: Anand et al.,2021). Big data applications are prominent across industries with easy access and streamlined technology (Benzidia et al.,2021). Almost 450 billion dollars are saved by the healthcare department of the United States from analysis of the patient dataset. The dataset is acquired from various sources, including hospitals, insurance companies, health providers, hospitals, and clinical researchers. The operational efficiency of epidemiology control and treatment of disease can be improved by big data. A study based on big data analysis was conducted by Alerasoul et al. (2021). It was found that information is a valuable source across the world and research on cloud data is increasing. Big data is regarded as a dataset, which has a size much more than traditional database software tools for managing, storing, and capturing information (Dubey et al.,2019). The decision-making of an organization can be transformed through various tools, which can improve the efficiency of the process, identification of future areas for innovation as well as engaging citizens in designing, analyzing, and implementation process (Su et al.,2021).

In the context of an organization, learning is a crucial aspect, which supports the process of innovation for achieving competitive advantage Barlette, Y., & Baillette, P. (2021). Businesses can acquire agility by learning. In this way, organizations can respond to the changing demands of customers, sustain in new markets and manufacture innovative products. The diversity of origins and complex applicability makes the concept of organizational learning unclear (Shamim et al.,2019). Organizational learning was defined by Rodríguez-Sánchez et al. (2021) as a non-hierarchical process for developing knowledge to enhance the efficiency of an organization. It has been claimed by some researchers that knowledge acquisition, its transformation, and integration are regarded as organizational learning, which can be utilized for various organizational purposes (Muñoz-Pascual et al.,2021). Thus, OLC is the process of acquiring knowledge, transferring and integrating it. Four conditions are required for organizational learning to work efficiently. The first condition is the commitment of the management in developing and promoting learning (Grandia & Voncken, 2019). The second condition is related to a shared perspective, which enables an organization to work as a common unit. The transfer and integration of knowledge from individual to collective level can fail when an organization has no definite objective (Côrte-Real et al.,2020). The third condition requires a suitable environment for promoting the exchange of knowledge to enhance the learning of individuals from the organization and organization from individuals (Wang et al.,2020). The fourth condition is related to an open mindset for testing new ideas and creating awareness for continuous experimentation and learning (Khan et al.,2021). The success of new ideas cannot be ensured in the absence of learning. Thus, learning from experience is the prerequisite for ensuring success (Chen, et al.,2019) The four dimensions of OLC have been depicted in Figure 5, which include a commitment of management, perspective of the system, experimentation and openness, transfer, and integration. Different aspects of PLC are identified by the four dimensions of OLC, yet they are closely linked with each other. The commitment and engagement of managers, executives, and employees are stressed by all dimensions of OLC in the creation of knowledge. Empirical evidence is provided by the research of Awanet al. (2021) and Bag et al. (2020) that a valid framework is represented by OLC dimensions to determine organizational learning in the IS research. The focus of current research studies has been on other theories, i.e.,

knowledge management and organizational learning, to better understand the factors of the environment beyond individual perceptions to implement a new system or technology (Behl et al.,2021). Therefore, the OLC model can be explored in the process of implementing big data by formulating the second set of hypotheses in this research. The hypotheses are framed in four steps according to the four limitations of the OLC model, i.e., commitment of management, the perspective of the system, experimentation and openness, transfer and integration.

Hypothesis:

H1: OLC has positive impact on OP.

H2: BDAN has positive impact on OP.

H3: BDAN mediates between OP and OLC

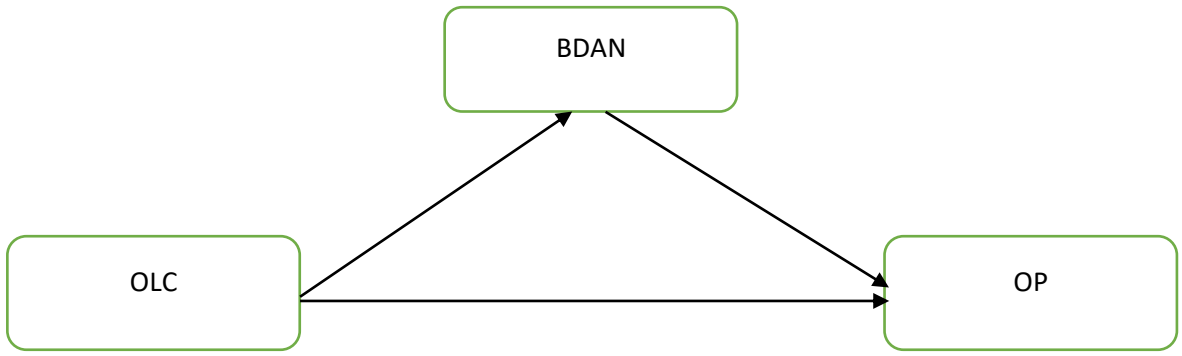

Figure 1.
Conceptual Framework

RESEARCH METHODOLOGY

This investigation utilized a survey-based methodology, and a total of 375 questionnaires were given to IT professionals from a variety of firms in a specific Asian region. The survey consisted of a total of 485 questions aimed to assess each respondent's expertise with big data analytics and their organization's organizational learning prowess. The survey included both closed- and open-ended questions to assess respondents' perspectives on their company's capacity for learning and big data analytics implementation and to elicit more nuanced information about their experiences with such implementation and the role that their company's learning capability played in it. In addition, the poll aimed to determine how respondents believed their organization utilized big data analytics and how much they benefited from it.

The data was evaluated using statistical approaches such as partial least squares structural equation modeling (PLS-SEM) to generate findings regarding the relationships between an organization's learning capability and the use of big data analytics. To ensure that the study's findings were typical of the general population, 375 individuals were used. This provides a general overview of the IT industry in the investigated Asian nations. Using a survey-based methodology, it was possible to determine whether or not the use of big data analytics correlates with an organization's inclination to learn.

RESULTS

Research Methodology

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Results

For the purpose of conducting the analysis, the study made use of the Sem-pls methodology, which is a two-step process consisting of the measurement model and the structural model.

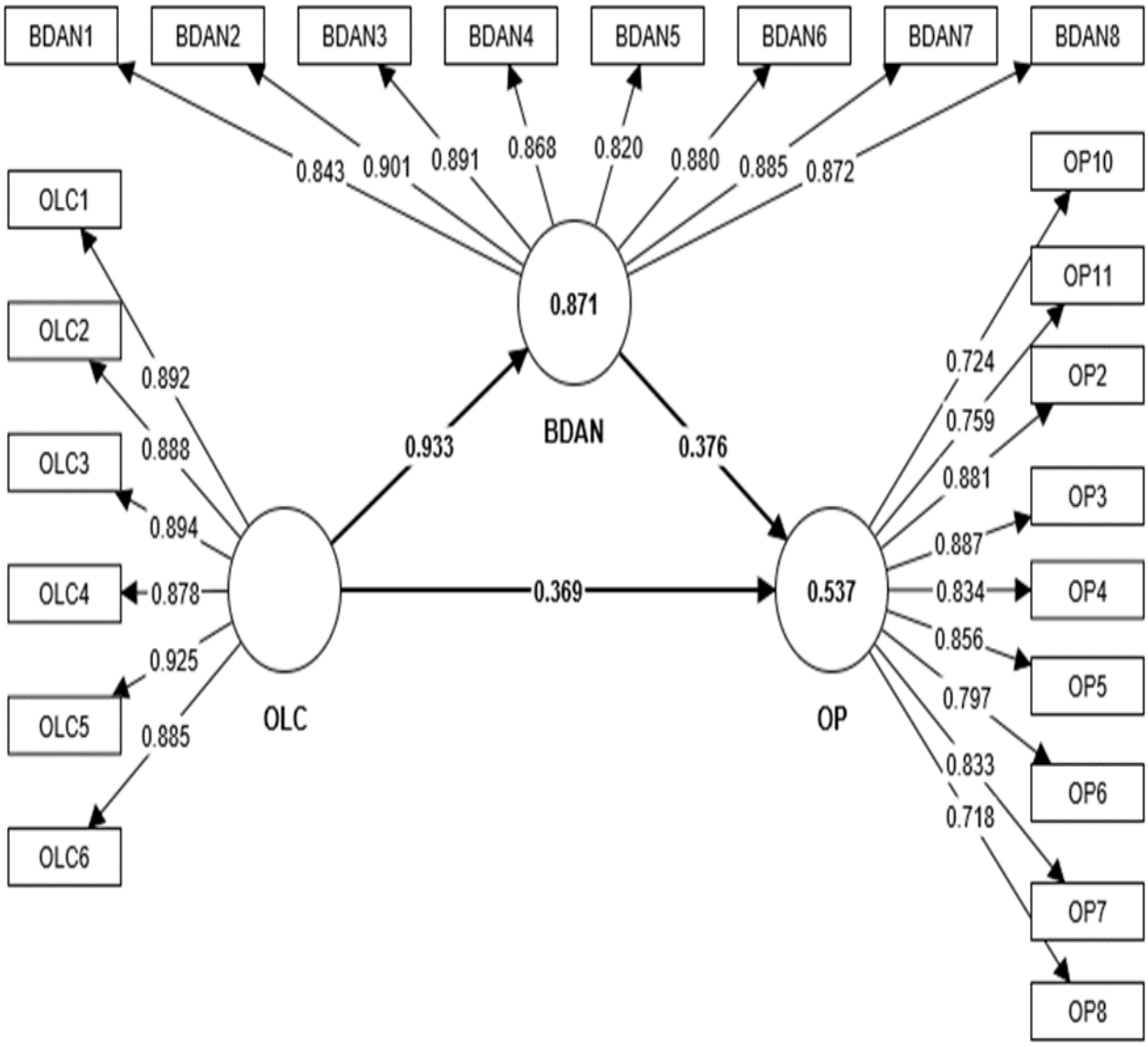

Figure 2.
Measurement Model

The "outer loadings" are regression coefficients that represent the relationships between latent and observable variables in Partial Least Squares Structural Equation Modeling (PLS-SEM). These coefficients are used to calculate the structural equations of the PLS-SEM model, allowing us to examine the direct effects of latent variables on observable variables. Higher values of outer loadings indicate a stronger correlation between latent and observable variables. The magnitude of the outer loadings can also aid in identifying the most influential predictors in the model, as demonstrated in Table 1.

Table 1.
Outer Loadings

	BDAN	OLC	OP
BDAN1	0.843		
BDAN2	0.901		
BDAN3	0.891		
BDAN4	0.868		
BDAN5	0.820		
BDAN6	0.880		
BDAN7	0.885		
BDAN8	0.872		
OLC1		0.892	
OLC2		0.888	
OLC3		0.894	
OLC4		0.878	
OLC5		0.925	
OLC6		0.885	
OP10			0.724
OP11			0.759
OP2			0.881
OP3			0.887
OP4			0.834
OP5			0.856
OP6			0.797
OP7			0.833
OP8			0.718

The measurement model's dependability is critical for Structural Equation Modeling (SEM) with Partial Least Squares (PLS), which necessitates evaluating the model's consistency and stability. The PLS-measurement SEM model represents the link between latent and measurable variables. It also has a significant impact on the model's accuracy and the outcomes it produces. PLS-trustworthiness SEM's is commonly assessed using composite reliability (CR) and average extracted variance (AVE). The CR value approaches 1 when it gets close to the null value, indicating the latent variable's dependability. CR is calculated by taking the mean square of the factor loadings for a latent variable. AVE, like R2 and R3, analyzes the amount of variation in an observable variable that can be attributed to latent causes, and it consistently converges on a high value.

Table 2.
Reliability Analysis

	h's alpha	ility (rho_a)	eliability (rho_c)	Average variance extracted (AVE)
BDAN	0.954	0.955	0.962	0.758
OLC	0.949	0.950	0.960	0.799
OP	0.935	0.938	0.945	0.660

Table 3, which can be found below, provides an illustration of the discriminant validity of this study's findings.

Table 3.
Discriminant validity

	BDAN	OLC	OP
BDAN	0.870		
OLC	0.933	0.894	
OP	0.721	0.720	0.812

In this study, discriminant validity was tested to verify there were no surprising relationships between variables. The results of the Fornell and Larker technique for analyzing data are presented in Table 3. As indicated by the table, which reveals that each bold loading for the constructs has a bigger value than the other values, all variables have high discriminant validity. To confirm the validity and dependability of the data, we may thus evaluate both the tables demonstrating convergent validity and reliability and the table demonstrating discriminant validity.

We used the structural model to validate the calculated hypothesis. A latent construct is assigned to each variable.

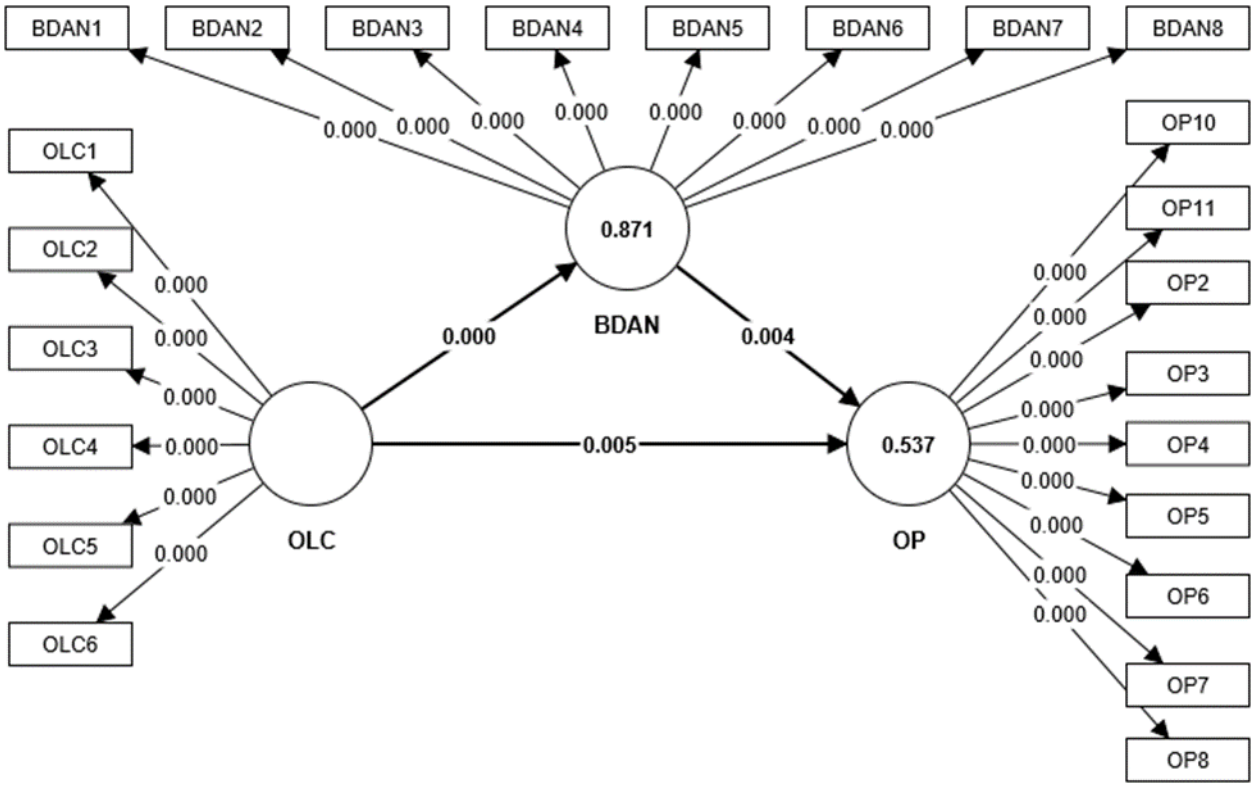

Figure 3.

Structural Model

In structural equation modeling (SEM), the Partial Least Squares (PLS) method is used to generate correlations between latent variables in order to better capture the causal structure of the data. PLS (Partial Least Squares) is utilized for this purpose. Often, the phrase "structural modeling" is applied to all of these techniques(Gadzo, et al.,2019). Extraction of structural equations from the measurement model is the initial stage in constructing the PLS-SEM structural model, which is then used to estimate external loadings. This model can be used to test hypotheses and forecast the associations between latent variables using previously obtained data. The study's findings are shown in Table 4, where it can be seen that each hypothesis was supported by an abundance of evidence. The study's findings demonstrate this.

Table 4.

Direct Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
BDAN -> OP	0.376	0.384	0.129	2.919	0.004
OLC -> BDAN	0.933	0.933	0.012	77.768	0.000
OLC -> OP	0.720	0.723	0.060	11.998	0.000

The conclusions of the mediation study are displayed in table 5 below; these findings illustrate that the mediation path is a beneficial way to take. The investigation discovered that the route of mediation had a statistically significant impact. The statistics that are statistically significant are presented in table 5 below.

Table 5.

Mediation Analysis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
OLC -> BDAN -> O	0.351	0.359	0.122	2.883	0.004

DISCUSSION AND CONCLUSION

This study aimed to assess an Asian nation's readiness for using Big Data Analytics (BDA) by measuring its organizational learning capacities. The outcomes of the study indicate that a company's capacity for learning has a significant effect on its use of BDA(Ciampi et al.,2021). The aforementioned corpus of research emphasizes the significance of organizational learning in the successful adoption of new technologies, which is consistent with the aforementioned finding.

The study also revealed that various features of an organization's learning capacity influenced the BDA adoption to varying degrees. Specifically, it was discovered that BDA was supported by the dimensions of experimentation, risk-taking, and involvement, but not the dimension of knowledge gain(Buzzao & Rizzi,2021).

The consequences of this study's findings extend far beyond the academic arena and into the professional world. Researchers are now aware, based on the outcomes of this study, that organizational learning capability is a critical component to consider when researching the implementation of BDA (Anand et al.,2021). There is a need for additional study to investigate the varied dimensions of organizational learning capability and their effects on BDA's implementation.

The findings of this study show that in order to promote widespread adoption of BDA, practitioners should concentrate on enhancing the organizational learning capacity of businesses. If businesses want to build an environment in which people are ready to learn and take chances, they must actively encourage these behaviors in the workplace. This will boost the company's goals of expansion through knowledge and originality.

CONCLUSION

In addition, the outcomes of the study highlight the significance of organizational learning capability in the effective deployment of BDA. According to the conclusions of the study, a country's organizational learning capability in Asia has a major impact on BDA implementation, both favorably and adversely. In addition, the study found that several components of an organization's learning capacity influence BDA adoption in various ways.

This study's conclusions have far-reaching ramifications, not only for academics but also for sector practitioners. According to the findings of the study, future research should focus on analyzing the numerous facets of organizational learning capability and the impact of these facets on the use of BDA. As a means of boosting the efficacy of BDA implementation, practitioners are made aware of the need of expanding an organization's learning capacity, as shown by the study. In conclusion, the findings of this study contribute to the existing body of knowledge on BDA implementation by highlighting the significance of organizational learning capability as a crucial component of effective implementation. Organizations interested in implementing BDA and enhancing their competitive edge in the digital era might gain valuable insights from the study's findings.

REFERENCES:

Chen, I. S., Fung, P. K., & Yuen, S. S. (2019). Dynamic capabilities of logistics service providers: Antecedents and performance implications. Asia Pacific Journal of Marketing and Logistics.

Awan, U., Shamim, S., Khan, Z., Zia, N. U., Shariq, S. M., & Khan, M. N. (2021). Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance. Technological Forecasting and Social Change, 168, 120766.

Bag, S., Wood, L. C., Xu, L., Dhamija, P., & Kayikci, Y. (2020). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. Resources, Conservation and Recycling, 153, 104559.

Behl, A. (2021). Antecedents to firm performance and competitiveness using the lens of big data analytics: a cross-cultural study. Management Decision, 60(2), 368-398.

Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics and firm performance: Findings from a mixed-method approach. Journal of Business Research, 98, 261-276.

Rialti, R., Marzi, G., Caputo, A., & Mayah, K. A. (2020). Achieving strategic flexibility in the era of big data: The importance of knowledge management and ambidexterity. Management Decision.

Lin, C., & Kunnathur, A. (2019). Strategic orientations, developmental culture, and big data capability. Journal of Business Research, 105, 49-60.

Mantok, S., Sekhon, H., Sahi, G. K., & Jones, P. (2019). Entrepreneurial orientation and the mediating role of organisational learning amongst Indian S-SMEs. Journal of Small Business and Enterprise Development, 26(5), 641-660.

Annarelli, A., Battistella, C., Nonino, F., Parida, V., & Pessot, E. (2021). Literature review on digitalization capabilities: Co-citation analysis of antecedents, conceptualization and consequences. Technological Forecasting and Social Change, 166, 120635.

Ferreira, J., Cardim, S., & Coelho, A. (2021). Dynamic capabilities and mediating effects of innovation on the competitive advantage and firm's performance: The moderating role of organizational learning capability. Journal of the Knowledge Economy, 12, 620-644.

Gadzo, S. G., Kportorgbi, H. K., & Gatsi, J. G. (2019). Credit risk and operational risk on financial performance of universal banks in Ghana: A partial least squared structural equation model (PLS SEM) approach. Cogent Economics & Finance, 7(1), 1589406.

Ciampi, F., Demi, S., Magrini, A., Marzi, G., & Papa, A. (2021). Exploring the impact of big data analytics capabilities on business model innovation: The mediating role of entrepreneurial orientation. Journal of Business Research, 123, 1-13.

Anand, A., Muskat, B., Creed, A., Zutshi, A., & Csepregi, A. (2021). Knowledge sharing, knowledge transfer and SMEs: evolution, antecedents, outcomes and directions. Personnel review, 50(9), 1873-1893.

Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. (2020). Exploring the relationship between big data analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities. Information & Management, 57(2), 103169.

Mikalef, P., van de Wetering, R., & Krogstie, J. (2021). Building dynamic capabilities by leveraging big data analytics: The role of organizational inertia. Information & Management, 58(6), 103412.

Buzzao, G., & Rizzi, F. (2021). On the conceptualization and measurement of dynamic capabilities for sustainability: Building theory through a systematic literature review. Business Strategy and the Environment, 30(1), 135-175.

Shamim, S., Zeng, J., Choksy, U. S., & Shariq, S. M. (2020). Connecting big data management capabilities with employee ambidexterity in Chinese multinational enterprises through the mediation of big data value creation at the employee level. International Business Review, 29(6), 101604.

Benzidia, S., Makaoui, N., & Bentahar, O. (2021). The impact of big data analytics and artificial intelligence on green supply chain process integration and hospital environmental performance. Technological forecasting and social change, 165, 120557.

Alerasoul, S. A., Afeltra, G., Hakala, H., Minelli, E., & Strozzi, F. (2021). Organisational learning, learning organisation, and learning orientation: An integrative review and framework. Human Resource Management Review, 32(3), 100854.

Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., & Papadopoulos, T. (2019). Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture. British Journal of Management, 30(2), 341-361.

Su, X., Zeng, W., Zheng, M., Jiang, X., Lin, W., & Xu, A. (2021). Big data analytics capabilities and organizational performance: the mediating effect of dual innovations. European Journal of Innovation Management, 25(4), 1142-1160.

Barlette, Y., & Baillette, P. (2021). Big data analytics in turbulent contexts: towards organizational change for enhanced agility. Production Planning & Control, 33(2-3), 105-122.

Shamim, S., Zeng, J., Shariq, S. M., & Khan, Z. (2019). Role of big data management in enhancing big data decision-making capability and quality among Chinese firms: A dynamic capabilities view. Information & Management, 56(6), 103135.

Rodríguez-Sánchez, A., Guinot, J., Chiva, R., & López-Cabrales, Á. (2021). How to emerge stronger: Antecedents and consequences of organizational resilience. Journal of Management & Organization, 27(3), 442-459.

Muñoz-Pascual, L., Curado, C., & Galende, J. (2021). How does the use of information technologies affect the adoption of environmental practices in SMEs? A mixed-methods approach. Review of Managerial Science, 15, 75-102.

Grandia, J., & Voncken, D. (2019). Sustainable public procurement: The impact of ability, motivation, and opportunity on the implementation of different types of sustainable public procurement. Sustainability, 11(19), 5215.

Côrte-Real, N., Ruivo, P., & Oliveira, T. (2020). Leveraging internet of things and big data analytics initiatives in European and American firms: Is data quality a way to extract business value?. Information & Management, 57(1), 103141.

Wang, C., Zhang, Q., & Zhang, W. (2020). Corporate social responsibility, Green supply chain management and firm performance: The moderating role of big-data analytics capability. Research in Transportation Business & Management, 37, 100557.

Khan, S. H., Majid, A., Yasir, M., & Javed, A. (2021). Social capital and business model innovation in SMEs: do organizational learning capabilities and entrepreneurial orientation really matter?. European Journal of Innovation Managemen