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Overcoming Entrepreneurial Challenges with Big Data Analytics Adoption to Accelerate Economic Recovery: Evidence from Malaysian Small Medium Enterprises

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ABSTRACT
COVID-19, the worldwide epidemic coronavirus illness, has a substantial influence on the world economy. Big Data Analytics (BDA) assists organization in gaining relevant insights, is being hailed as a new tactical weapon in the sector during this pandemic covid-19 period. This study looked at the impact of organizational factors on BDA adoption to boost business by enhancing organizational performance. SmartPLS 3.3.2 was used to analyse data from 185 manufacturing SMEs in Malaysia in this study. This research identifies key organizational factors that influence BDA adoption and it impact on the organizational performance. The novelty of this research is significant as it integrate organizational context with adoption big data analytics on the impact of organizational performance to example a holistic view of research model. The findings facilitate Malaysian SMEs in strategizing BDA adoption, the changing business climate, and may serve as a model for businesses in developing countries as a key driver in accelerating economic recovery

Keywords: *Small Medium Enterprises, Malaysia, Absorptive Capacity, Big Data Analytics, Performance, Technological Resource Competency*

1. INTRODUCTION

Small and medium-sized businesses (SMEs) companies have long been the backbone of Malaysia's economy. In 2019, they accounted for 48.4% of total employment and for gross domestic product (GDP) about 38.9% [1]. SMEs have less assets and cash reserves, as well as lower output levels, they are more financially vulnerable than larger enterprises. Consequently, the outbreak of Covid-19 has had a significant impact on SMEs. In 2019, 20% of SMEs had drop in sales however 34% of sales decrease in 2020. The majority of respondents (89%) believe their firms will turn around in the third quarter or later this year. The return to normalcy is largely contingent on Malaysia's immunization program, particularly its speed, coverage, and efficacy. Malaysia started the immunisation campaign on February 26th. By September 2021, it is expected that about 80% of the population would have been vaccinated [2]. Consumers' migration to online marketplaces affects SMEs' ability to compete in a variety of way. SMEs labour productivity is 67.8% of that of non-SMEs. While the digital gap does not fully explain the disparities, it does play a significant role. Business owners who do not have a digital presence or data analytics tools do not have visibility into shifting customer trends. It becomes difficult to engage customers and adjust business offerings as a result. The modest size of SMEs often lack the funds and expertise to adopt digital solutions. Despite government measures to promote digitisation, just 25% of Malaysian enterprises have advanced their digital transformation plans, with the remaining 60% slowing down. If SMEs want to effectively integrate increasingly complex technology solutions into their businesses, they must first master the basics, substantial support and case-by-case mentorship in the future [2]. Big data analytics assists in gathering critical information from a wide range of unstructured data and converting it into usable information that enables businesses to make educated policy decisions and increase corporate efficiency and productivity [3].

Therefore Big data isn't a "one-and-done" approach. The goal of big data is to assist SMEs in anticipating the next disruptive breakthrough. For predictive analysis, continuous data gathering is required to assess trends. To ensure accuracy and timeliness, data collecting must be integrated into the organization's daily procedures. 'Velocity' is one of the most important characteristics of big data. Velocity, in this context, refers to an organization's need to continuously integrate, store, and analyse fresh data frequently. Following a thorough examination of the

essential insights required to operate a business today and in the future, as well as the data required to provide this views, SMEs would need to develop a data management plan.

Adopting Big Data Analytics (BDA) is one of the most effective methods. Various contributing elements influence BDA adoption in general [4]. As far as organizational factors that may influence BDA adoption in the SMEs Malaysia, the affect of technological resource competency, absorptive capacity and organizational size should be looked at [5]. This condition confirms that more research is being conducted to investigate the factors that contribute to the BDA's extraordinarily complex adoption procedure to boost organizational performance among manufacturer SMEs.

1.1. Literature

The organizational context concentrate on the organization that might have a favourable or negative impact on the decision-making process if an emerging innovations are introduced [6]. According to Agrawal (2016), the three most essential factors to consider when determining whether or not to deploy an innovation include technological resource competency, absorptive capacity and organizational size.

1.1.1. Technological resource competency

Technological resource competency encompasses both IT infrastructure and IT capability and is also known as technological readiness [7]. BDA is a game-changing breakthrough that can completely revolutionize strategic planning and operational procedures in any organization, but it necessitates significant IT and management expertise. Organizational structures, practices, and policies must all be altered in order for more drastic reforms to be possible [8]. As a result, implementing BDA necessitates organizational and process modifications [9]. Academics agree that technological resource expertise is a necessity for BDA implementation in the field of business analytics and big data [10]. Several studies have linked IT failure to management issues such as a lack of business collaboration on IT abilities, expertise of how to incorporation of technology into business plan, and how to find and educate trained technical employees to use the BDA. The sexist job of the twenty-first century is that of a data scientist [11]. As a result, we hypothesized the following.

H1: Technological resource competency significantly affect BDA adoption in a positive manner among Malaysian manufacturing SMEs.

1.1.2. Organizational Size

A common determinant of organizational adoption of technology breakthroughs is the organizational size according to Jeyaraj, Rottman, and Lacity (2006). The size of the organization is one of the elements explored in the literature on the dissemination of innovation. [12]. Larger organizations typically have more resources to test new technologies and, as a result, are better able to withstand the expenses and risks associated with doing so. According to Ramdani et al., (2009) size is matters, the larger businesses owner is more likely to adopt new innovation. However, capable size of organizations has fund to invest in BDA installations, due to the high cost of BDA systems. We proposed the following hypothesis.

H2: Organizational size positively affect BDA adoption among Malaysian manufacturing SMEs.

1.1.3. Absorptive Capacity

The capability of a firm to recognize, absorb, and use the value of new, external knowledge for commercial objectives is referred to as its absorptive capacity [13]. In the literature on innovation, absorptive capacity has become a key topic [14]. Absorptive capacity is a capability that is quantified or seen at the organizational level through business model modifications, innovation of products, acquiring new market, and innovative organizational structures and procedures [15]. This is comparable to relying on the route, which is a company's capacity and motivation to accept innovation. It is heavily influenced by an organization's past experience with relevant preceding technologies [16]. The following hypothesis is suggested.

H3: Absorptive capacity positively affect BDA adoption among manufacturing SMEs in Malaysia.

1.1.4. Big data analytics on organizational performance

According to a previous study, IT resources boost corporate value and have an impact on organizational performance [17]. Big Data Analytics are crucial instruments for maintaining corporate competitiveness in extremely volatile marketplaces [18]. With more advanced algorithms that allow for prescriptive analysis, BDA approaches can analyse larger amounts and types of data. Chen et al. (2014) investigated the influence of IT capabilities on organizational performance through the lens of organizational capabilities. Palacios-Marqués, Devece, Llopis-Albert, and Galindo-Martn (2017) found connection between IT competencies and corporate success in their research. Hence, we suggest the following hypothesis.

H4: The adoption of BDA positively affects organisational performance among Malaysian manufacturing SMEs.

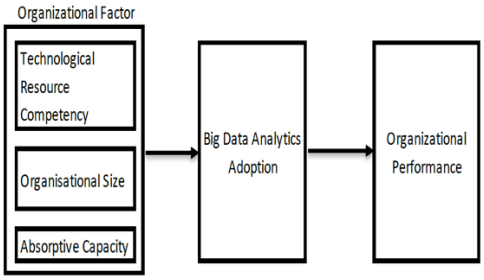

Figure 1 Research Framework

2. METHODOLOGY

The purpose of this research is to determine the impact of organizational predictors such as technological resource competency, absorptive capacity and organizational size on adoption of BDA that have effect on the performance among Malaysian manufacturing SMEs, to acquire replies from the intended respondents, a quantitative study was done.

2.1. Sample and Data Collection

Given the goal of the study, we employed a questionnaire survey to obtain 185 usable replies from Malaysian manufacturing SMEs.

2.2. Measures

The link between the primary constructs was investigated using partial least square (PLS) approaches. Smart-PLS 3.2.2 is used to test the measurement and structural models. PLS-SEM analytics were chosen since they can analyse all directions at the same time and do not require a large sample size. Non-normal outcomes, new associations, small samples, and prediction-oriented research are all reasons to use PLS-SEM [19]. The sample size was determined using the G*Power program. Because there are three predictors of BDA uptake in our study, we used a PLS model. For our PLS model with a medium effect size of 0.15, a minimum sample size of 55 was required to obtain power of 0.80.[19]. As a result, with 185 responses, our PLS model has met and exceeded the needed sample size threshold. A seven-point Likert scale was used to gauge the reaction.

3. DATA ANALYSIS AND RESULT

3.1. Demographic Profile

BDA was used by 91.89% of the respondents. The minority of respondents came from the category industry of Aerospace (3.53%). The minority of responders have been in business for more than 31 years. The minority of respondents used a outsourced IT model, with a revenue of more RM10 million and fewer than 75 employees.

3.2. Measurement Model Analysis

The integrity of the measurements has been established by analyzing their validity and reliability. Validity analyzes the instrument's quality for developing measurements in a specific idea, whereas reliability indicates to the assessment instrument quality for continual measurement of a notion [20]. Figure 2 demonstrates that all values above those in the measuring models support convergent validity, with all structures exceeding the minimal 0.5 value.

Constructs	Items	Loadings
Big Data Analytics Adoption	BDA 1	0.957
	BDA 2	0.960
	BDA 3	0.943
Technological Resource Competency	TC 1	0.897
	TC 2	0.931
	TC 3	0.923
Absorptive Capacity	AC 1	0.897
	AC 2	0.955
	AC 3	0.954
	AC 4	0.933
Organizational Size	OS 1	0.950
	OS 2	0.944
	OS 3	0.901
Organizational Performance	OP 1	0.862
	OP 2	0.901
	OP 3	0.889
	OP 4	0.924
	OP 5	0.883
	OP 6	0.917
	OP 7	0.911
	OP 8	0.881

Figure 2 Convergent validity of constructs

Figure 3 depicts the measurement study of Average Variance Extracted (AVE), Composite Reliability (CR), Cronbach's Alpha constructs reliability and validity, and reliability coefficient (rho A). For each construct, the CR value is greater than 0.6.

Constructs	AVE	CR	rho_A	Cronbach's Alpha
Big Data Analytics Adoption	0.908	0.967	0.950	0.950
Technological Resource Competency	0.941	0.841	0.907	0.906
Absorptive Capacity	0.965	0.874	0.955	0.952
Organizational Size	0.952	0.868	0.939	0.924
Organizational Performance	0.850	0.971	0.965	0.965

Figure 3 Constructs reliability and validity

The conservative limit is a heterotrait-monotrait ratio (HTMT) of fewer than 0.85 [21]. Figure 4 depicts the Heterotrait-monotrait (HTMT) for the variables.

	AC	BDA	OP	OS	TC
Absorptive Capacity					
BDA Adoption	0.761				
Organisational Performance	0.643	0.538			
Organisational Size	0.59	0.547	0.589		
Technological Resource Competency	0.809	0.655	0.814	0.567	

Figure 4 Heterotrait-monotrait (HTMT)

3.3. Structural Model

The structural model is measured by looking at the collinearity of determination effect size (f^2), (R^2), predictive relevance (Q^2) and path coefficients (β). Variance Inflation Factor (VIF) values were used to determine collinearity. VIF values ranged from 1.276 to 2.603 for all constructs. Following the evaluation of the VIF values, we employed bootstrapping approach with 500 resamples of PLS 3.3.2 to acquire the standard path coefficients values, standard errors and t-values in order to assess the significance of the association between each of the hypotheses [19]. The method used by Hayes and Preacher (2013) to assess the indirect effects of technological resource competency on BDA adoption. The structural model route analysis is shown in Figure 5. The direct path coefficient and the direct path coefficient have a substantial relationship.

Hypotheses	β	SD	T-statistics	P-values	f^2
H1: TC --> BDA	0.225	0.12	2.323*	0.039	0.071
H2: OS --> BDA	0.045	0.068	0.616	0.271	0.004
H3: AC --> BDA	0.218	0.102	1.805**	0.01	0.047
H4: BDA --> OP	0.199	0.101	2.058*	0.022	0.375

Figure 5 Structural model path analysis

According to Henseler et al. (2014), the f^2 effect sizes of 0.02, 0.15, and 0.35 can be utilized for low, medium, and large impacts of the independent latent variables, respectively. The organizational size has been found to have no influence on BDA adoption (i.e.,f^2=0.004). Technological resource competency (f^2=0.071) and absorptive capacity (f^2=0.047) have a medium impact on BDA adoption. However, BDA adoption (f^2=0.375) has been found to have large impact on organizational performance.

4. DISCUSSION

4.1. Discussion

The organizational determinants of technological resource competency and absorptive capacity have a beneficial effect on the adoption of BDA, which is consistent with previous literature [6]. However, organizational size does not appear to have a major influence on adoption of BDA among Malaysian manufacturing SMEs in this study. Organizational size in this research show not significant the result is inconsistent from majority previous study [10]. In terms of the relationship between the organizational size and its embrace of IT innovation, the findings of a study contradict this is because of their smaller size and lower levels of bureaucracy, SMEs can be more agile and inventive. Big data analytics (BDA) improves marketing efficiency and data processing while also reducing costs [22]. In fact, organizations who adopt BDA gain a competitive advantage and thereby achieve high performance [23]. IT adoption equips a company with the tools it needs to boost its overall performance [24]. IT infrastructure that is well-developed in expertise, software and hardware will provides a technological foundation for data analysis, allowing the company to smoothly enter the big data sector [25]. Increased absorptive capacity will stimulate disruptive and innovation thinking (employee development, proclivity for innovation, and higher education), This could allow BDA to be extended to higher levels of the organization in the future [26]. This study's empirical findings have yielded some useful insights that may be added to the present BDA adoption literature.

4.2. Practical and Theoretical Implications

This research has contributed to the research literature on the adoption of technology. This study confirms that technological resource competency and absorptive capability are critical predictors to BDA adoption among SMEs. However, organizational size has no significant influence. It is interesting to observe that BDA adoption significantly enhance firm performance of the manufacturing SMEs. SME digitization is crucial to their long-term sustainability in an increasingly digital market, yet the digital divide between firms creates major challenges.

The framework of this study offers a new standpoint, which was designed to investigate BDA adoption and its impact in driving performance. This study offers a fresh viewpoint by examining the influence of critical organizational factors that influence BDA adoption in driving performance. The findings of this research can be utilized to help SMEs businesses in Malaysia and other rising nations to stay afloat.

5. CONCLUSION

This novel research paradigm is theoretically sound, and we have put it to the test using proper survey methods and findings. Despite the fact that Industrial Revolution 4.0 and the COVID-19 pandemic have advanced digitization in general, SMEs are in danger of falling behind. Big data analytics adoption enables SME entrepreneurs to look outside their tiny organizations for data handling strategies and approaches, and should be able to successfully use BDA

in the process of making decisions effectively. They must be able to plunge into the huge ocean of knowledge accessible to them and investigate it. Aside from the assistance from authorities and government in adopting BDA, organizational capabilities are critical factors. Furthermore, BDA adoption has been a proven strategy that can be utilized by entrepreneurs in riding the wave of entrepreneurial challenges today. Integrating organizational capabilities and BDA adoption drive prospective businesses to accelerate economic recovery via sustainable organizational performance.

REFERENCES

[1] DOSM, "DEPARTMENT OF STATISTICS MALAYSIA PRESS RELEASE SMALL AND MEDIUM ENTERPRISES (Smes) PERFORMANCE 2018," 2019.

[2] Neghin Vaghefi & Yap Jo-yee, "Helping SMEs Rise to Challenges Posed by the Covid-19 Pandemic Helping SMEs Rise to Challenges Posed by the Covid-19 Pandemic," *Penang Inst. Issues*, no. Feb 2021, p. 9, 2021.

[3] Y. Niu, L. Ying, J. Yang, M. Bao, and C. B. Sivaparthipan, "Organizational business intelligence and decision making using big data analytics," *Inf. Process. Manag.*, vol. 58, no. 6, p. 102725, 2021.

[4] S. Sun, C. G. Cegielski, L. Jia, and D. J. Hall, "Understanding The Factors Affecting The Organizational Adoption Of Big Data," *J. Comput. Inf. Syst.*, vol. 58, no. 3, pp. 193–203, 2016.

[5] K. P. Agrawal, "Investigating The Determinants Of Big Data Analytics (BDA) Adoption In Emerging Economies," *Acad. Manag. Proc.*, 2016.

[6] Y. Lai, H. Sun, and J. Ren, "Understanding The Determinants Of Big Data Analytics (BDA) Adoption In Logistics And Supply Chain Management: An Empirical Investigation," *Int. J. Logist. Manag.*, 2018.

[7] Wang and Y. Wang, "Determinants Of Firms' Knowledge Management System Implementation: An Empirical Study," *Comput. Human Behav.*, 2016.

[8] R. G. Fichman, "Real options and IT platform adoption: Implications for theory and practice," *Information Systems Research*. 2004.

[9] D. Chatterjee, R. Grewal, and V. Sambamurthy, "Shaping Up For E-Commerce: Institutional Enablers Of The Organizational Assimilation Of Web Technologies," *MIS Q.*, 2002.

[10] P. Maroufkhani, M. L. Tseng, M. Iranmanesh, W. K. W. Ismail, and H. Khalid, "Big data analytics adoption: Determinants and performances among small to medium-sized enterprises," *Int. J. Inf. Manage.*, vol. 54, no. February, p. 102190, 2020.

[11] T. H. Davenport and D. J. Patil, "Data scientist: The Sexiest Job Of The 21st Century," *Harv. Bus. Rev.*, 2012.

[12] C. Low, Y. Chen, and M. Wu, "Understanding the determinants of cloud computing adoption," *Ind. Manag. Data Syst.*, 2011.

[13] Cohen and D. A. Levinthal, "Absorptive Capacity: A New Perspective On Learning And Innovation," *Adm. Sci. Q.*, 1990.

[14] S. A. Zahra and G. George, "Absorptive Capacity: A Review, Reconceptualization, And Extension," *Academy of Management Review*. 2002.

[15] A. Daghfous, "Absorptive Capacity And The Implementation Of Knowledge-Intensive Best Practices.," *SAM Adv. Manag. J.*, 2004.

[16] K. B. Ooi, V. H. Lee, G. W. H. Tan, T. S. Hew, and J. J. Hew, "Cloud computing in manufacturing: The next industrial revolution in Malaysia?," *Expert Syst. Appl.*, vol. 93, pp. 376–394, 2018.

[17] A. S. Aydiner, E. Tatoglu, E. Bayraktar, S. Zaim, and D. Delen, "Business Analytics And Firm Performance: The Mediating Role Of Business Process Performance," *J. Bus. Res.*, vol. 96, no. October 2018, pp. 228–237, 2019.

[18] F. Ciampi, S. Demi, A. Magrini, G. Marzi, and A. Papa, "Exploring the impact of big data analytics capabilities on business model innovation: The mediating role of entrepreneurial orientation," *J. Bus. Res.*, vol. 123, no. September 2020, pp. 1–13, 2021.

[19] J. F. Hair, M. Sarstedt, L. Hopkins, and V. G. Kuppelwieser, "Partial Least Squares Structural Equation Modeling (PLS-SEM)," *Eur. Bus. Rev.*, 2014.

[20] U. Sekaran and R. Bougie, *Research Method Of Business: A Skill-Building Approach 7th Edition*, 7th ed. John Wiley & Sons Ltd, 2016.

[21] J. Henseler, C. M. Ringle, and M. Sarstedt, "A new criterion for assessing discriminant validity in variance-based structural equation modeling," *J. Acad. Mark. Sci.*, 2014.

[22] S. Verma, S. S. Bhattacharyya, and S. Kumar, "An extension of the technology acceptance model in the big data analytics system implementation environment," *Inf. Process. Manag.*, vol. 54, no. 5, pp. 791–806, 2018.

[23] A. S. Bharadwaj, "A Resource-Based Perspective On Information Technology Capability And Firm Performance: An Empirical Investigation," *MIS Q.*, 2000.

[24] Lin and Lin, "Determinants Of E-Business Diffusion: A Test Of The Technology Diffusion Perspective," *Technovation*, 2008.

[25] C. L. Iacovou, I. Benbasat, and A. S. Dexter, "Electronic Data Interchange And Small Businesses: Adoption And Impact Of Technology," *MISQ*, 1995.

[26] Y. Lin and L. Y. Wu, "Exploring The Role Of Dynamic Capabilities In Firm Performance Under The Resource-Based View Framework," *J. Bus. Res.*, vol. 67, no. 3, pp. 407–413, 2014.