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A Conceptual Study: Technology Adoption among Malaysian Manufacturing SMEs for Corporate Sustainability in the Context of IR 4.0

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Abstract:

Small and Medium Enterprises (SMEs) are the backbone of the Malaysian economy and played an important role in the economic transformation after gaining independence. In Malaysia, SMEs provide 5.7 million jobs to 70% of the Malaysian workforce. Malaysia's SME's export is in an upward trajectory and the largest contributor was beverages and tobacco, chemicals, manufactured goods, and miscellaneous manufactured articles. In 2019, the principal export destinations were Singapore, China, and the United States.

Through academic literature, the paper describes various challenges of technology adoption among manufacturing SMEs in Malaysia, and overcoming those issues will allow SMEs to grow and remain competitive in the global markets. The current scenario indicates that the growth of the economy is highly dependent on the growth and development of the SMEs but, the SMEs are lagging in terms of technology adoption to cultivate innovation, reducing operation costs, and increasing productivity. Hence, these challenges have deterred the Malaysian SMEs to compete with other larger economies. Additionally, Malaysian SMEs have to take opportunities of Industry 4.0 to enhance the efficiency and productivity of their manufacturing processes to expand their participation in the global markets as the domestic markets are limited.

Keywords: *Small and medium enterprises, industry 4.0, technology adoption, productivity*

1. Introduction

Small and Medium Enterprises (SMEs) have been central to the Malaysian economic transformation of Malaysia since the early 1990s and played an important role in economic growth, social upliftment, and political stability (Ahmad & Seet, 2009; Razak, 2011). Malaysian SMEs, particularly the manufacturing sectors are considered to be the backbone of the national economy. The path taken by Malaysia to become a fully developed country by 2020 is entirely dependent on the achievements of SMEs (Omar, Arokiasamy & Ismail, 2009). Over the years, to reach Vision 2020 and become a developed economy, the economy has changed from an industry-based economy to a knowledge-based one. In line with the huge contribution of SMEs towards national wealth creation, various government agencies have been spearheading the development of SMEs. To increase the number of SMEs, various programs and facilities are provided to improve their performance and competitiveness in the global arena.

Malaysia has been categorized as one of the most open economies of the world, with a trade to GDP ratio of 130% over a period from 2014 to 2018 compared to other developing countries in East Asia and the Pacific (EPU, 2016). Malaysia with a relatively small population of 32 million, limits the size of the domestic market, therefore firms have to exploit international markets to increase export performance to accomplish sustainability (EPU, 2016). One of the enabling factors for Malaysian SMEs to gain into international markets are through the development of information technology (Abdullah et al., 2011).

2. Definition of SMEs in Malaysia

The Malaysian National SME Development Council (NSDC) approved the common definition of SMEs across economic sectors, for adoption by all government ministries and agencies involved in SME development, as well as financial institutions (NSDC, 2013). There are two key sectors, namely manufacturing, and services, and other sectors; based on two criteria (i) sales turnover (ii) employment for sectors, and the size of the operation (SME Annual Report, 2014). The definition as shown in Table 1 was relevant as a result of economic changes such as price inflation, structural shifts, and changes in business practices that have occurred since 2005. The establishment of an appropriate definition is important to identify the eligibility of the target group for government assistance (SME Annual Report, 2014). However, the definition excludes if (i) a company that is publicly listed in the mainboard in Malaysia or other countries; or/and (ii) a subsidiary of a public listed company in the mainboard in Malaysia or other countries, or/and (iii) a subsidiary of large firms, multinational corporations (MNCs), government-linked companies (GLCs), Ministry of Finance Incorporated companies, and state-owned enterprises.

Category	Micro	Small	Medium
Manufacturing	Sales turnover of less than RM300,000 (RM200,000 – RM250,000)	Sales turnover from RM300,000 to less than RM15 million	Sales turnover from RM 15 million to not exceeding RM 50 million
Services and other sectors		OR	OR
		Employees from 5 to less than 75	Employees from 75 to not exceeding 200
	OR	Sales turnover from RM 300,000 to less than RM 3 million	Sales turnover from RM3 million to not exceeding RM 20 million
	OR	OR	OR
	Employees less than 5	Employees from 5 to less than 30	Employees from 30 to not exceeding 75

Table 1: Definition of SMEs in Terms of Annual Sales Turnover and Full-Time Employees
Source: National SME Development Council, NSDC (2013)

3. The Role of SMEs in the Malaysian Economy

SMEs play a critical role in the economy, and their value is determined by their ability to create jobs, promote innovation, foster competition, and generate economic gain (Bannock, 1981). The Malaysian government's continuous support to uplift the export performance of SMEs can be seen through various policies implemented (Abdullah & Zain, 2011). In the Eight Malaysia Plan, the government raised the allocation from RM 1,561.6 million to RM 2,160.2 million in the Ninth Malaysia Plan (Economic Planning Unit, 2006). To provide guidance, promotion, production performance, R&D activities, and product development, other support programs, institutions, and agencies such as SME Bank and SMECORP have been set up by the Government (Central Bank of Malaysia, 2008; Ahmad & Seet, 2009).

The government's Eleventh Malaysian Plan (11MP), which was introduced from 2016 to 2020, emphasized the significance of SMEs in the nation's growth and their ultimate roles in increasing export revenues and job creations. The 11MP specified the importance of the manufacturing sector and is expected to accord more than 74% of GDP contribution in the economy (SME Annual Report, 2017). Subsequently, the nation has embarked on a new economic development programme launched in October 2019 named the Shared Prosperity Vision 2030 (SPV2030). The objective of the new economic development programme is to enhance the high value-added economic activities by restructuring the labour intensive low-skill economy into a knowledge-based economy. This is to raise the standards of living among Malaysians. Another reason to introduce the SPV2030 is to elevate the country's economic growth compared to other East Asian countries. Presently, Malaysia's growth is lagging as a result of high dependence on export commodities which may fluctuate in price and slow adoption of high technology.

The contribution of SMEs to the country's GDP grew from 37.8 % (RM491.2 billion) in 2017 to 38.3% (RM521.7 billion) in 2018, compared to the overall GDP of the country of RM1.36 trillion during the year (DOSM, 2019). In 2018, SMEs reported growth of 6.2% (2017:7.1%) marginally above the 6.0% long-term average growth (2001-2017) and growth continued to outperform Malaysia's overall GDP, which recorded 4.7% in 2018. (2017:5.7%) (DOSM, 2019). SMEs employ 5.7 million Malaysians, accounting for 70% of the country's employment (DOSM, 2019).

The manufacturing sector is made of 49,101 establishments of the total SMEs in Malaysia (SME Economic Census, 2017). The manufacturing SMEs makes up 42.1% of employment compared to 57.9% of employment by large firms (DOSM, 2017). The manufacturing SMEs are dependent on 74% Malaysian and a small number of 26% of the non-Malaysian workforce (Labour Force Statistics, 2016).

Malaysia's SMEs exports increased by 3.4% to RM171.9 billion in 2018 as compared to 7.2% in 2017 amounting to RM166.2 billion. The manufacturing SMEs accounted for 5.1% of Malaysia's GDP and 48.3 % of the total SMEs exports in 2018. The largest contributors were beverages & tobacco, chemicals, manufactured goods, and various manufactured goods. The primary export destinations were Singapore (18.6%), China (8.9%), and the United States (7.8%) (DOSM, 2019).

As the bulk of SMEs is now engaged in local enterprises, manufacturing SMEs are exploring various government programmes to penetrate domestic to international markets. SMEs may expand, automate, export, and start more businesses supported by government efforts.

4. The Malaysian Digital Economy

The digital economy refers to the actions taken by both the private and public sectors to adopt and utilize digital technologies to communicate with the people, deliver goods and services and meet other core functions to raise productivity, revenue, and incomes (MDEC, 2019). The establishment of Multimedia Development Corporation (MDEC) to manage the Multimedia Super Corridor (MSC), a national initiative to promote the nation's Information and Communications Technology (ICT) industry. Since its inception, MSC programs have been a catalyst to drive the nation's digital economy. There is a total of 2,954 active MSC Malaysia status companies registered since its inception in 1996. A

total of RM472 billion of revenue had been generated as of 2018 and a total of 182,538 jobs have been created in 2018 (MDEC, 2020).

The digital economy in Malaysia is expected to grow rapidly. In 2018, the Malaysian digital economy recorded a value of RM267.7 billion, contributing 18.5% to the national economy (DOSM, 2019). Information and Communication Technology (ICT) contributed 18.5% to the country's GDP. Income through e-commerce transactions recorded a value of RM447.8 billion in 2017 against RM398.2 billion in 2015 with an annual growth rate of 6%. And, the expenditure on E-Commerce transactions recorded a value of RM228.8 billion in 2017 as compared to RM195.1 billion in 2015 with an annual growth rate of 8.3%. The main contributor to e-commerce income and expenditure was the manufacturing sector at RM287.5 billion and RM179.5 billion respectively (DOSM, 2019).

In 2016, MDEC in partnership with Alibaba Group launched the Digital Free Trade Zone (DFTZ), the first electronic hub (e-hub) that facilitates SMEs into the e-commerce market by simplifying regulations, reducing trade barriers, and providing support (SMECOPR, 2017).

The creation of the National Big Data Analytics (BDA) ecosystem in 2015 will enable SMEs to stay relevant and innovative by utilizing BDA tools to compete more effectively with bigger enterprises. The availability of BDA tools via cloud platforms allows SMEs to retain ownership and storage of their private company data (MDEC, 2019).

The broadband Internet and cellular penetration rate in Malaysia are at 127.1% and 131.4 % respectively (MCMC, 2019). The Internet of Things (IoT) framework established in 2015, aims to create a national ecosystem to enable the proliferation of use and industrialization of IoT as a new source of growth for the national economy. The IoT industry is expected to contribute RM9.5 billion to the national GDP by 2020 and RM42.5 billion by 2025 (MCMC, 2019).

The Malaysian government launched the National Industrial Revolution 4.0 Framework (Industry4WRD) in 2018 to transform the manufacturing sectors and related services within the period from 2018 to 2025. The policy envisions Malaysia to be a strategic partner for smart manufacturing in the Asia Pacific region, a primary destination for investment in the high technology industry, and a total solutions provider for cutting-edge technology. This policy is targeted to increase manufacturing productivity for every worker by 30% from RM106, 647, increase the contribution of the manufacturing sector to the national economy from RM254.7 billion to RM392 billion, strengthen innovation capacity and capability by improving Malaysia's Global Innovation Index from 35 to the top 30 and increase the number of skilled workers in the manufacturing sector, especially in the SMEs from 18% to 35% (MITI, 2019).

5. Literature Review

This section outlines the selected research undertaken on technology adoption among Malaysian SMEs and presented in Table 2.

No	Authors	Subject	Area
1	Jaganathan et al, (2018)	Determinants for ICT Adoption and Problems: Evidence from Rural Based Small and Medium Enterprises in Malaysia	The study concentrated on some advanced models that yielded positive results and aided in determining the level of technology acceptance among firms or decision-makers. This study has important implications for the owners/managers of rural SMEs attempting to adopt new technology.
2	Ramayah et al., (2013)	Determinants of Technology Adoption among Malaysian SMEs: n IDT Perspective	According to the findings, perceived relative advantage, observability, and image are all positively associated with technology adoption, although compatibility and simplicity of use are not.
3	Abdullah, Wahab&Sham suddin, (2013)	Exploring the Common Technology Adoption Enablers among Malaysian SMEs: Qualitative Findings	The study includes concepts of technology adoption that are not limited to a specific technology but broaden the understanding of technology as a means to improve the effectiveness and efficiency of operations in organizations.
4	Tan et al., (2012)	Effects of Industry Type on ICT Adoption among Malaysian SMEs	The study built on the moderating effect of industry types on the characteristics of technological innovation and ICT adoption which is scarce to date.
5	Murad & Thompson, (2011)	The importance of technology diffusion in Malaysian Manufacturing SMEs	The relevance of technology diffusion and adoption in Malaysian manufacturing SMEs, Malaysia Plans on Technology and SMEs (1996-2010), and viewpoints on why Malaysian manufacturing enterprises chose to accept or not integrate new technologies into their business operations.
6	Lal, (2008)	Information and communication technology adoption in Malaysian SMEs	The role of the institutional environment in the adoption of ICT in Malaysian SMEs was investigated in this study. The findings imply that the owners' knowledge base, language barriers between employers and employees, worker skill intensity, and enterprises with foreign technical partnerships have all played a role in the adoption of new technologies.

No	Authors	Subject	Area
7	Abdullah, Shamsuddin, (2009)	Technology Adoption among SMEs in Malaysian: Development of an Assessment Process	The importance of the technology adoption process as a competitive resource for SMEs was stressed in this article. However, research on technology adoption among Malaysian SMEs reveals the lack of an integrated technology adoption measurement process.
8	Alam& Noor, (2009)	ICT Adoption in Malaysian SMEs from Services Sectors: Preliminary Findings	The study revealed the extent to which small and medium-sized businesses in the southern region of Malaysia are prepared for ICT adoption. A judgment sampling SMEs from service sectors of the northern region was selected as the research area to study the rate of usage of ICT by the SMEs.
9	Moghavvemi et al., (2012)	A conceptual paper on Competitive Advantages Through IT Innovation Adoption by SMEs	The result of this study will help the government to identify determinants of IT innovation adoption among SMEs owners in Malaysia. Attitude and self-efficacy were included in the Innovation Diffusion Theory to suit it to the individual situation.
10	Ghobakhloo et al., (2012)	Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises	A review of literature includes theories, perspectives, empirical research, and case studies related to IT adoption, in particular within SMEs from various databases. A model was proposed on the effective IT adoption which is believed to provide managers, vendors, consultants, and governments with a practical synopsis of the IT adoption process within SMEs.
11	Umrani&Johl, (2018)	How Different Ownership Structures Perform in Industry 4.0: A Case of Malaysian Manufacturing SMEs	The study attempts to investigate the relationship of ownership structures on firm performance with a mediating role of innovation. Using Baron and Kenny's approach, the results revealed that, majority of SMEs prefer traditional business methods, and results in a higher failure rate.
12	Ghobakhloo& Ching, (2019)	The Adoption of Digital Technologies of Smart Manufacturing in SMEs	The study encompasses a cross-sectional survey to capture the opinions of Malaysian and Iranian participating SMEs. The outcome states that a collection of technological, organizational, and environmental factors determines SMEs' decision for Smart Manufacturing-related Information and Digital Technologies adoption.
13	Bahrin et al., (2016)	Industry 4.0: A review On Industrial Automation and Robotic	The paper reviews the concept trend of robotic technology in industry 4.0 or similar ideas. A much-needed exposure for the engineering students to new inventions of technologies revolution as well as to create the business mind for a better future.

Table 2: Selected Prior Research on Technology Adoption among Malaysian SMEs

6. Technology Adoption Challenges

Similar to SMEs in other countries, Malaysian SMEs encounter various challenges relating to technology adoption. Studies found that SMEs are challenged by financial and non-financial constraints besides management skills (Salikin, Wahab& Muhammad, 2014). Literature has shown that Malaysian SMEs have a great failure and low survival rate (Chong, 2012). Abdullah and Rosli (2015) suggest that Information and Communication Technology (ICT) had a positive impact on business performance besides human resource and market orientation.

Technology adoption has been challenged by financing, legal and regulation, quality of the human capital, market, and infrastructure (SME Corporation, 2012). SMEs face problems of talent management, culture, lack of awareness, and education (Abdul Yatid, 2019). Most SMEs revealed that implementation of smart industrial solutions is low due to firms are more inclined to traditional production methods (Umrani&Johl, 2018).

Prior research by Wolcott et al., (2008) revealed that challenges faced by SMEs attempting to adopt ICT can be grouped into 6 categories: capabilities, resources, access, attitude, context, and operations. Table 3 summarizes the challenges identified within the 6 categories developed by Wolcott (2008).

Capabilities	Resources	Access
<ul style="list-style-type: none"> ▪ Inadequate IT user skills ▪ Poor troubleshooting skills ▪ Inadequate IT development capabilities ▪ Limited IT planning capabilities ▪ Lack of IT knowledge 	<ul style="list-style-type: none"> ▪ Lack of money ▪ Lack of time ▪ Lack of information 	<ul style="list-style-type: none"> ▪ Inadequate hardware and software ▪ Poor IT infrastructure
Attitude	Context	Operations
<ul style="list-style-type: none"> ▪ Resistance to technology ▪ Lack of engagement ▪ Lack of value and personal incentives ▪ Lack of confidence ▪ Lack of awareness ▪ Lack of trust 	<ul style="list-style-type: none"> ▪ Cultural factors ▪ Mismatch between technology and social/business systems 	<ul style="list-style-type: none"> ▪ Lack of operational support and administration ▪ Inappropriate operational procedures

*Table 3: Challenges to ICT Adoption by SMEs
Source: Wolcott (2008)*

7. Significance of the Study

The ICT adoption rate within SMEs in Malaysia is at 20% and most manufacturing firms apply less than 50% of automation (Abdul Yatid, 2019) when compared to other developed countries like Germany and the US where the adoption stands at 56% and 50% respectively (McKinsey, 2016). Most of the Malaysian SMEs are either at the level of Industry 2.0 and 3.0 (Malay Mail, 2019). Therefore, a strong ICT strategy is pivotal to gain a competitive advantage in the fast-moving environment. As a result of the lack of digitization, the majority of SMEs prefer to trade domestically instead of penetrating the international market. The manufacturing SMEs have to be committed to adapt to the advancement of technology and reap the benefits that expedite the launch of products and increase resource efficiency through the use of technology. Adopting the right technology will enable SMEs to increase profitability, growth, and productivity. Technology can reshape the traditional operations of a business to digitization that enables transactions to be successfully carried out across boundaries. In view of the study, technology adoption is vital for SMEs to remain competitive. Implementation of key technologies that best supports the SMEs has become a requirement and is no longer seen as a choice, especially for export-ready SMEs.

8. Findings and Conclusion

The literature revealed that the overall landscape of the global economy has evolved over the years as a result of globalization and the digital revolution. In summary, digital transformation has changed how an organization functions, while also increasing productivity. The existing literature discusses issues related to technology adoption among SMEs from various dimensions but, there are limited findings pertaining to the adoption of key technologies related to smart manufacturing such as Artificial Intelligence (AI), Cloud Computing, Industrial Internet of things (IoT), and, Big Data Analytics. SMEs must capitalize on key technologies for business sustainability. From the existing studies, the following recommendations are proposed:

- Better synchronization between Business and IT strategy to optimize business value through technology adoption programmes within SMEs.
- Technology funding through various alternatives such as FINTECH, Crowdfunding via blockchain.
- Promote outcome-based intervention projects to encourage SMEs to embrace high technology solutions.
- Emphasize technology adoption culture among employees (SMEs).
- Promote Change Management practices among SME owners/senior management.
- Relevant authorities to organize motivational talks and share success stories to create awareness of technology adoption among SMEs.
- Relevant authorities to provide reskilling and upskilling opportunities for SMEs to embark on digital transformation as many SMEs are facing talent shortage as technology related to smart manufacturing are limited and these technologies are still in an infancy stage.
- Review of foreign labour policies to assist SMEs to hire expertise from abroad to expedite technology transformation programmes.

9. References

- i. Abdullah, Nor Hazana & Shamsuddin, Alina. (2009). Technology adoption among SMEs in Malaysia: Development of an assessment process. PICMET: Portland International Center for Management of Engineering and Technology, Proceedings. 2644-2648. 10.1109/PICMET.2009.5261819.
- ii. Abdullah, N. & Zain. S. (2011). The Internationalization Theory and Malaysian Small Medium Enterprises (SMEs). International Journal of Trade, Economics, and Finance, Vol. 2, No. 4.
- iii. Abdullah, N., Wahab, E., & Shamsuddin, A. (2013). Exploring the Common Technology Adoption Enablers among Malaysian SMEs: Qualitative Findings. The Journal of Men's Studies, 3, 78

- iv. Abdullah, N., &Rosli, N. F. (2015). An Evaluation on Determinants of SMEs Performance in Malaysia. *South East Asia Journal of Contemporary Business, Economics, and Law*, 7(2), 16-23. Retrieved from http://seajbel.com/wp-content/uploads/2015/09/KLIBEL7_Bus-16.pdf
- v. Abdul Yatid, Moonyati. Why is digital adoption by SMEs not taking off? Reported in the *New Straits Times*. January 24, 2019. Retrieved from <https://www.nst.com.my/opinion/columnists/2019/01/453789/why-digital-adoption-smes-not-taking>
- vi. Abdullah, Syahida& Muhammad, Amran. (2008). The Development of Entrepreneurship in Malaysia: State-led Initiatives. *Asian Journal of Technology Innovation – ASIAN J TECHNOL INNOV*. 16. 101-116.
- vii. Ahmad, N. H., &Seet, P. S. (2009). Dissecting behaviours associated with business failure: A qualitative study of SME owners in Malaysia and Australia. *Asian Social Science*, 5(9), 98-104.
- viii. Alam, S.S.; Noor, M K.M. ICT adoption in small and medium enterprises: An empirical evidence of service sectors in Malaysia. *Int. J. Bus. Manag.* 2009, 4, 112-125.
- ix. Bahrin, M., Othman, M., Azli, N.H., &Talib, M.F. (2016). *INDUSTRY 4.0: A REVIEW ON INDUSTRIAL AUTOMATION AND ROBOTIC*.
- x. Bannock, G. (1981). *The Economics of Small Firms: Return from the Wilderness*. Blackwell, Oxford.
- xi. Central Bank of Malaysia. (2008). Establishment of a RM200 million Micro Enterprise Fund. Kuala Lumpur.
- xii. Chong, W. T. (2012). Critical success factors for small and medium enterprises: perceptions of entrepreneurs in urban Malaysia. *Journal of Business and Policy Research*, 7(4), 204-215.
- xiii. Department of Statistics Malaysia. (2017). *Small and Medium Enterprise Gross Domestic Product 2016*. Release Date: 21 September 2017.
- xiv. Department of Statistics Malaysian. (2019). *Small and Medium Enterprise Gross Domestic Product 2018*.Release Date: 31 July 2019.
- xv. Economic Planning Unit. (2006). *The Ninth Malaysia Plan, 2006-2010*. Kuala Lumpur: Prime Ministers Department. 2006.
- xvi. Economic Planning Unit. (2016). *The Eleventh Malaysia Plan,2016- 2020*. Kuala Lumpur: Prime Ministers Department.
- xvii. Ghobakhloo, Morteza& Hong, Tang &Sabouri, Mohammad &Zulkifli, Norzima. (2012). Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises. *Information*. 3. 10.3390/info3010036
- xviii. Ghobakhloo, Morteza&Ching, Ng. (2019). Adoption of Digital Technologies of Smart Manufacturing in SMEs. *Journal of Industrial Information Integration*. 16. 100107. 10.1016/j.jii.2019.100107.
- xix. Jaganathan, M., Ahmad, S., Ishak, K. A., Nafi, S. N. M., &Uthamaputhran, L. (2018). Determinants for ICT adoption and problems: Evidence from rural based small and medium enterprises in Malaysia. *International Journal of Entrepreneurship*, 22(4), 1-13.
- xx. Labour Force Statistics Malaysia. (2016). Department of Statistics, Malaysia.
- xxi. Release date 25 March 2016. Retrieved from [https://www.dosm.gov.my/v1/uploads/files/Statistik%20Tenaga%20Buruh,%20Malaysia,%20Januari%202016%20\(Website\)\(1\).pdf](https://www.dosm.gov.my/v1/uploads/files/Statistik%20Tenaga%20Buruh,%20Malaysia,%20Januari%202016%20(Website)(1).pdf)
- xxii. Lal, K. (2008) Information and communication technology adoption in Malaysian SMEs, *Asian Journal of Technology Innovation*, 16:1, 161-186, DOI: 10.1080/19761597.2008.9668652
- xxiii. Malay Mail. 2019. Mida consistent in assisting SMEs embrace industry 4.0. Reported in the *Malay Mail*. August 02, 2019. Retrieved from <https://www.malaymail.com/news/money/2019/08/02/mida-consistent-in-assisting-smes-embrace-industry-4.0/1776971>
- xxiv. Malaysian Communication and Multimedia Commission, MCMC. (2019). *Connectivity Key to Digital Transformation, Industry Performance Report 2018 (Rep.)*. Cyberjaya, Selangor: MCMC
- xxv. Malaysian Digital Corporation, MDEC (2019). *Energizing the Nation's Digital Economy*. (n.d.). Retrieved February 12, 2020, from <https://mdec.my/what-weoffer/msc-malaysia>
- xxvi. Malaysian Digital Corporation, MDEC. (2020). *What is Digital Economy?* Retrieved February 2, 2020, from <https://mdec.my/about-mdec/what-is-digital-economy>
- xxvii. Malaysian Communication and Multimedia Commission, MCMC. (2019). *Connectivity Key to Digital Transformation, Industry Performance Report 2018 (Rep.)*. Cyberjaya, Selangor: MCMC
- xxviii. McKinsey. (2016). *Industry 4.0 after the initial hype-Where manufacturers are finding value and how they can best capture it*. Retrieved on June 19th, 2020, from https://www.mckinsey.com/~media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/getting%20the%20most%20out%20of%20industry%204%200/mckinsey_industry_40_2016.ashx
- xxix. MITI. (2019). *Trade and Economic Information booklet for 3rd. Quarter. Report 2019*.
- xxx. Retrieved from: <https://www.miti.gov.my/miti/resources/Trade%20and%20economic%20Information%20Booklet%20TNEQ319.pdf>
- xxxi. MITI. (2018). *MITI Report 2018*. Released in June 2019. Retrieved from: https://www.miti.gov.my/miti/resources/MITI%20Report/MITI_Report_2018.pdf

- xxxii. Moghavvemi, Sedigheh&Salleh, Noor & Zhao, Wenjie&Mattila, Minna. (2012). The Entrepreneurs Perception on Information Technology Innovation Adoption: An Empirical Analysis of the Role of Precipitating Events on Usage Behavior. *Innovation-Management Policy & Practice*, 14. 231-246. 10.5172/ mp.2012.14.2.231
- xxxiii. Murad, M.A. and Thomson, J.D. (2011) External environment factors influencing the technology adoption-diffusion decision in Malaysian manufacturing small medium enterprises (SMEs). *Progress in Business Innovation & Technology Management*, 1, 13-22.
- xxxiv. National SME Development Council. (2013). Guideline for New SME Definition October 2013. Kuala Lumpur.https://www.smecorp.gov.my/images/pdf/Guideline_for_New_SME_Definition_7Jan2014.pdf
- xxxv. Omar S Sedge., Arokiasamy L., & Ismail S S. (2009). The background and challenges faced by the Small Medium Enterprises. A Human Resource Development Perspective. *International Journal of Business and Management*, 4(10), 95-102.
- xxxvi. Ramayah, T., Mohamad, O., Omar, A., Marimuthu, M., & Jasmine Yeap A. L. (2013). Green Manufacturing Practices and Performance among SMEs: Evidence from a Developing Nation. In P. O. de Pablos (Ed.), *Green Technologies and Business Practices: An IT Approach* (pp. 208-225). USA: Information Science Reference
- xxxvii. Razak, R, A (2011). Entrepreneurial orientation as a universal Remedy for the Receding Productivity in Malaysian Small and Medium Enterprises: A Theoretical Perspective. *International Journal of Business and Social Science*, Vol. 2 No 19.
- xxxviii. Salikin, N, Wahab, N & Muhammad, I (2014), 'Strengths and Weaknesses among Malaysian SMEs: Financial Management Perspectives', *Procedia-Social and Behavioral Sciences*, 129, pp. 334-340.
- xxxix. SME Corporation. (2014). SME Annual Report 2013/2014. September 2014. Retrieved from: <http://www.smecorp.gov.my/vn2/node/1475>
- xl. SME Corporation (2018). SME Annual Report 2017/18 - A Connected World: Digitalising SMEs. Retrieved from http://www.smecorp.gov.my/index.php/en/?option=com_content&view=article&layout=edit&id=3342
- xli. SME Corporation Malaysia (2017). SME Annual Report 2016/2017. Retrieved from: <http://www.smecorp.gov.my/index.php/en/laporan-tahunan/2150-sme-annual-report-2016-17>
- xl.ii. SME Corporation Malaysia. Economic Census 2016: Profile of SMEs. 29 September 2017. Retrieved from:https://www.smecorp.gov.my/images/SMEAR/latest/2/Census%20English_FINAL.pdf
- xl.iii. SME Corporation Malaysia (2012). SME Master Plan 2012 - 2020. Kuala Lumpur. Retrieved from:[http://www.smecorp.gov.my/vn2/sites/default/files/SME%20Masterplan%202012-2020%20\(booklet\)_0_0.Pdf](http://www.smecorp.gov.my/vn2/sites/default/files/SME%20Masterplan%202012-2020%20(booklet)_0_0.Pdf)
- xl.iv. Tan, Khong&Eze, Uchenna& Chong, Siong-Choy. (2012). Effects of Industry Type on ICT Adoption among Malaysian SMEs. *Journal of Supply Chain and Customer Relationship Management*. 1-12. 10.5171/2012.113797.
- xl.vi. Umrani, AI, Johl, SK & Ibrahim, MY. (2015). Corporate Governance practices and problems faced by SMEs in Malaysia. *Global Business and Management Research: An International Journal*, 7(2), 71-77.
- xl.vii. Wolcott, P., Kamal, M., & Qureshi, S. (2008). Meeting the challenges of ICT adoption by micro-enterprises. *Journal of Enterprise Information Management*, 21 (6), 616-632.