INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 13, Issue 5, (2023) E-ISSN: 2222-6990

The Impact of Leadership, Innovation, and Organisation Learning on the Digital Maturity of Organisations in Malaysia

Christine Pamela Chandrakasan[1], Paridah Daud[1], Omar Musa[2], Awang Iskandar Awang Jidon[1], Mohd Husyairi Mohd Hanapiah[1]

[1]UNITAR International University, Tierra Crest, Jalan SS6/3, 47301 Petaling Jaya, Selangor, Malaysia, [2]Jaycorp Berhad, Malaysia

Corresponding Author Email: paridah69@unitar.my

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v13-i5/16838 DOI:10.6007/IJARBSS/v13-i5/16838

Published Date: *09* May 2023

Abstract

The broad range of digital disruption has become ubiquitous to organizations in the light of movement restrictions imposed to curb the global pandemic Covid-19. Digital interaction became the numerous modes of communication in urban societies worldwide. The evolution of digital technology has been rampant worldwide, but the adaptation was slower in Malaysia compared to neighboring southeast Asian countries, pre-covid-19. The pandemic brought about a forceful digital transformation in Malaysia with management playing a fervent role in its amplification. Leadership, innovation, and organizational learning have become fundamental incorporations for every organization to have sustainable digital maturity. Leadership is evaluated from both capability and competency perspectives. Innovation is looked at from sustainable and breakthrough innovations. Organizational learning includes knowledge management and learning culture. This study is quantitative research with a sample size of 147 respondents from organizations within Malaysia that uses digital technologies in their day-to-day operations. Structured comparative research was applied using a systematic comparison of measurement instruments with multivariate data analysis within Malaysia. Our findings indicate a strong and positive correlation between digital maturity and innovation. Leadership and organizational learning have a moderately strong and positive correlation with Digital Maturity. The findings can contribute to managerial and policy improvement toward digital transformation, while avenues for future research directions are discussed.

Keywords: Digital Maturity, Digital Technology, Digital Strategy, Leadership, Innovation, Organizational Learnings

Introduction

This research is founded based on the digital adaptation and maturity of organizations in Malaysia and the possible impact of contribution factors specifically leadership, innovation,

and organizational learning. Malaysia is maturing in its third industrial revolution with innovations and technology adaptations, consisting of infrastructure and applications related to the mobile internet, and IT systems. Malaysia's goal is to get to the fourth industrial revolution through 5G installation nationwide, involving Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, cryptography, robotics, augmented reality, and virtual reality (Regenysys, 2020). The Covid-19 pandemic resulted in enforced lockdowns worldwide that became a catalyst for businesses to transform digitally. Digital platforms that are used for communication such as video conferencing and collaboration tools saw a 100% surge in usage (Liang, 2020). The pandemic makes it an absolute necessity for businesses that were slow to transform to embrace digital maturity effectively (Fitzpatrick et al., 2020).

To fully understand the digitization and adoption of digital transformation in Malaysia, we look into the Digital Maturity of organizations. Maturity is not just the implementation of technology but bridging the strategy of the company to the workforce and culture (Kane et al., 2016). In a study conducted by Rossmann (2020), several factors impact the influence of digital maturity in an organization which includes strategic capability, leadership, marketability, operational competence, employees, organizational learning, availability of technology, and governance of it. Based on a prior study conducted by Keiser (2017), digital maturity in an organization is assessed from the angle of digital competence, insights, and organizational culture. Digital strategy is influenced by innovation, organizational leadership, knowledge sharing, access to information, knowledge management, learning culture, and performance. All these factors are structured into 3 main contributing factors namely leadership, innovation, and organizational learning.

Background of Study

Organizations have been wanting to digitize their business before the Covid-19 pandemic as digital adaption is key to long-term business sustainability, according to Malaysia (Kini, 2020). However, according to Forrester (2021), only less than half of service firms in Malaysia are currently implementing and expanding digital transformation. Digital communication was a lifeline for work continuity in Malaysia during the Covid-19 lockdown. World Bank (2021) ties digital connectivity to digital entrepreneurship, as a key contributing factor in enabling Malaysia to become a key player in South East Asia. Substantiating this, Forrester (2021) emphasized the importance of digital capabilities in promoting innovation across all business sectors.

Unfortunately, Malaysian leaders lacked the depth of digital readiness, which can dampen the growth of digital maturity based on (Ferry, 2018). Only 3% of businesses have leaders who are digitally equipped and capable in Malaysia based on a study conducted by Advertising + Marketing magazine (Malaysia, 2018). Key influential factors and challenges in establishing a digitally matured organization in Malaysia are systematically viewed from the areas of leadership capabilities, organizational culture, and innovation in the digital transformation of organizations. These factors are strong components in Malaysia that contribute to the success of digital maturity according to (Rossmann, 2020; Kieser, 2017).

Research Problem

Malaysian leaders, among Asia Pacific leaders, are lacking digital readiness and can risk the growth of digital maturity due to the inability to change and adapt, according to (Ferry, 2018). That aside, according to Randstad (2018), 9/10 employees believe they do not have the digital capabilities required to work in a fully functional digital environment. To make it worse, during

the Covid-19 pandemic, over 80% of companies experienced challenges with communications, connectivity, and infrastructure during the lockdown phase in Malaysia, according to (Ernst and Young, 2020). Despite being the backbone of Malaysia's business environment, according to Tong & Gong (2020) published by Khazanah Research Institute, SMEs' performance towards digital changes is laggard. To stay important in the ever-changing ecosystem, companies must create, alter, adapt, and evaluate their digital strategies. To move towards sustainable digital maturity, key contributing factors need to be identified and clarified.

Based on the ongoing challenges in Malaysia in achieving digital maturity, three areas are consistently acknowledged which are innovation, leadership, and organizational learning. The areas of digital maturity are studied from the angle of market capabilities, organization capabilities, and organization strategies as laid out by both (Rossmann, 2020; Kieser, 2017). The areas of innovation are studied on a broad spectrum of sustainable innovation across all sectors per Forrester, 2021, and breakthrough innovation in times of Covid-19 pandemic challenges. The areas of leadership as highlighted by Rossmann (2020); Kieser (2017) are studied from the angle of leadership capabilities and leadership competency following the challenges highlighted on digital leadership in Malaysia by Ferry (2018) and Advertising + Marketing magazine (Malaysia, 2018). Whereas organizational learning as referred to by Kieser (2017) is knowledge management and learning culture which is also following World Bank (2021) on Malaysia's digital transformation. In a nutshell, innovation, leadership, and organizational learning are key contributing factors in leveraging a successful business strategy.

Significance of the Research

The result of this research can positively influence the employees and management teams in an organization, as well as in the government sectors involving nationwide bills and policies. Policymakers from corporate and government sectors may use the result to understand how leadership, innovation, and organizational learning affect digital maturity and make appropriate changes in their internal policies. An example of policy change in an organization is to minimize digital divides such as accessibility of computers and the internet regardless of demographics to boost engagement. Policymakers can foster market openness in the digital business environment based on the result of this research by taking into consideration standing barriers in adopting a digital business environment. An example of such a barrier is the lack of digital knowledge by the employees and management. This research can also be used as a reference to identify the best digital transformation strategy within an organization to improve digital maturity.

Literature Review

The Resource-Based View and Dynamic Capabilities

The resource-based view (RBV) looks into long-term transformation whereas dynamic capabilities are based on rapid changes. RBV identifies and extends an organization's competitive advantages over time (Peteraf, 1993) by examining a few processes such as utilizing the tools it has at its disposal (Chen et al., 2021; Peteraf, 1993) and maximizing these resources to spearhead competitive advantages (Teece & Pisano, 1994). Dynamic capabilities suggest that a company's performance is primarily dictated by its ability to respond to constant change while generating value and potential in a competitive environment (Wójcik, 2015; Lin & Wu, 2014). Dynamic capabilities strive to continuously optimize and build new

processes to stay relevant in a rapidly evolving market setting (Teece and Pisano, 1994). The resource-based view and dynamic capabilities will both provide an overarching framework for analyzing digital maturity in Malaysia based on the impact of leadership, innovation, and organizational learning, in a fast-changing environment and the betterment of Malaysia's vision of digital advancements.

Dependent Variable: Digital Maturity

Digital maturity is a phase of embracing and introducing transition rather than a single action (Kane et al., 2019) by incorporating technology into an organization's processes, management, and community (Kane et al., 2015). Digital transformation tends to be inclined towards ad-hoc changes based on the immediate needs of the environment. In other words, it's the reaction of the organization to digital trends regardless of needs. The underlying need is dependent on the optimization of consumers, management and employees, and competitors in the adoption of digital transformation (Kane et al., 2015).

There are different stages of digital maturity as the organization grows and the process is never complete. Quantifying digital maturity has over time expanded to various frameworks by leading consulting firms worldwide. Rossmann, 2020 corroborates models through digitally matured organizations, consulting firms, and traceable definitions to identify eight sectors of digital maturity which are strategy, leadership, business, and operating model, people, culture, governance, and technology. Digital strategic capability is reviewed from the accessibility of resources, communication, and execution (Rossmann, 2020) and accentuated by Kieser (2017) in measuring the success of execution through quantifiable goals using customer insights.

Independent Variable: Leadership

The growth and development of leadership is an impediment factor for an organization to thrive (Cacioppe, 1998). Leadership skills have to continuously evolve with time to complement organizational success (Cacioppe, 1998; Johnson, 2017). Behavioral skills contribute to the leadership-follower relationship through needs and best practices to maximize performance (Hodgson & White, 2003). Situational leadership studies the type of employees in an organization and tunes leadership skills accordingly (Hersey & Blanchard, 1979).

Leadership capability identifies with being coherent with digital transformation, forward-thinking and persistent leadership which is required in companies to continuously be disruptive and continuously adapt and progress with the existing business (Williams & Sullivan, 2011). In a study by Higgs & Rowland (2000), leadership competency is dependent on adaptation to change in an organization. In a study conducted on fifteen countries, the most competent leaders are said to be able to communicate expectations as well as engage employees to outperform their capacity (Giles, 2016).

Independent Variable: Organization Learning

The dynamic capabilities of combining both organizational and functional skills advocate management capabilities (Teece and Pisano, 1994). Dynamic capability is most profound in improving performance within an organization (Lin & Wu, 2014). The impact of advanced digitization is not fully understood due to a lack of strategy and encouragement towards innovation and a lack of competencies. Learning and development professionals can break down this barrier by developing an enhanced learning portfolio of products and services;

while shaping the culture of innovation (Vey et al., 2017). Knowledge management solution in an organization is essential as it captures all useful knowledge within the organization, organizes and distributed them for it to be accessible for use by everyone in that organization (Davenport, 1994). Johnston & Hawke (2002) highlighted that learning culture is a set of attributes, values, and practices embedded in an organization's learning process. It includes the acquisition of information, its interpretation, and cognitive changes (Johnston & Hawke, 2002). To achieve digital maturity, an organization must embrace digital transformation into its learning culture.

Independent Variable: Innovation

Organizations have to maximize short-term goals and manage cash resources on innovations in the long run. To balance both sides, ambidexterity is a critical ability for managers to lead an organization efficiently (Sinha, 2016). Mortensen & Bloch (2005) describe invention and improvisation as the development or enhancement of something new or existing, whether it's a product or a process, or in other areas like sales, marketing, or interactive organizational operations. We refer to Huang et al (2017) positive conceptual interpretation, aligning RBV and dynamic capabilities by describing innovation and developing values for users through integrated technology.

Sustainable innovation plays a significantly large and crucial role in a company's continual improvements whether, in process, cost tuning, consumer satisfaction, and demands met or revenue increase as the market understanding is more well versed among employees and the turnaround through product development roadmap stages in R&D is common (Satell, 2017). To contribute and remain competitive in a dynamic market, organizations take on immense pressure on digitally transforming businesses and step up innovation growth. (Kohli and Melville, 2019). Early-stage SMEs and innovators penetrate hard to resolve problems and challenge norms which leads to breakthrough innovations (Satell, 2017).

Hypothesis

Based on the above discussion, the following hypothesis is created

H1*:* There is a significant relationship between leadership and the digital maturity of an organization

H2: There is a significant relationship between innovation and the digital maturity of an organization

H3: There is a significant relationship between organizational learning and the digital maturity of an organization

Conceptual Framework

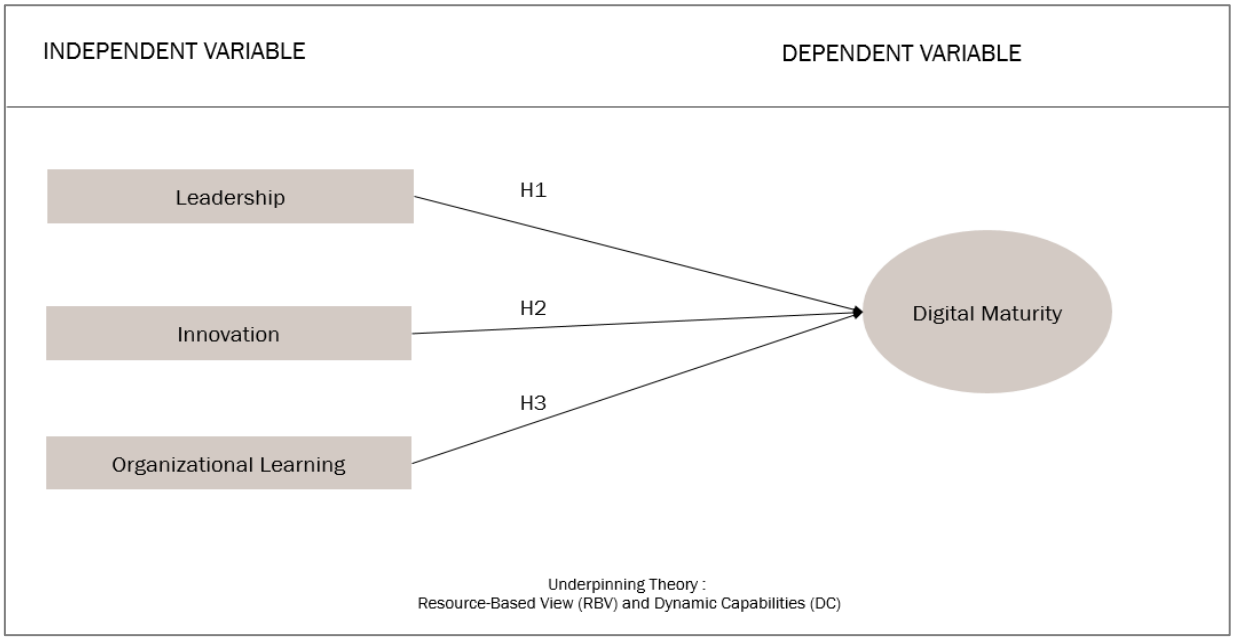

Fig. 1: Conceptual Framework between Independent and Dependent Variables

Methodology

This quantitative design is a systematic investigation of an issue where the researcher gathers all information related to potential respondents by sampling it. Thereafter the results from the respondents will be depicted in numerical form (McMillan & Schumacher, 2010). The research approach uses the deductive method whereby current and well-documented theoretical propositions are used as a foundation in defining research questions (Saunders & Lewis, 2012). The questionnaire was published using Google Forms which is an electronic-based questionnaire and sent out to the general public to be filled out. Statistical Package for Social Science (SPSS), is used to analyze the data obtained from the questionnaire through thorough statistical breakdown. According to statistics on the labor force in Malaysia, which are available through the Department of Statistics Malaysia website, there are 907,065 SME organizations in Malaysia at the time of this research. These organizations are divided into various sectors such as manufacturing, agriculture, construction, education, environment, mining and quarrying, services, banking and insurance, food and beverages, and so on.

The unit of analysis in this research is the organization itself as digital maturity is a collective factor within the context of an organization. To further strengthen this research, we use the respondents which are employees working at the Executive or Managerial level as a proxy for the organization itself. We received 155 responses from the survey. According to Knofczynski & Munfrom (2008), when three independent variables are examined, the sample size should contain a minimum of 127 respondents for a good prediction level, and this target is achieved for this research. According to Green (1991), in a linear regression model for multiple regression with k predictor variables, the sample size is recommended to be that of N = 50 + 8k, whereby k represents the number of predictors. In this event, three predictors X1, X2, and X3 yield a sample of 74 (Green, 1991), and this research met the criteria needed. However, based on Krejcie & Morgan (1970), the known population of above 100,000 is capped at 384 sample size but due to the time limitation needed to conduct this study, the sample size achieved at 155 is retained and analyzed using the linear regression model.

Results and Analysis

Demographics

There was a good balance of gender responses of 74 females and 81 males out of 155 respondents. Categories of age groups with an age range of 31 to 40 represent the majority of respondents at 45.2%, followed by 41 to 50 at 25.8%. There was also a good balance of executives, middle management, and senior management. 50 respondents were executives, 53 respondents are in middle management, and 52 were in senior management. The majority of respondents had over 5 years of working experience in their organization. Finance and financial services had the largest respondents of 14.8% of the total respondent size, followed by manufacturing and logistic. There were 21 identified industries catering to 93.5% of total respondents and 6.5% under others. Companies with fewer than 1000 employees were the largest contribution of this survey at 67.1%.

Normality

Kolmogorov-Smirnov was used to identify the normal distribution of the population. The original population is N=155 but this contained outliers that were removed to obtain a strong normal distribution yielding a final sample size of N=147 with a significant level, *P* is >0.05 (Mishra et al., 2009).

Table 1
Normality for Digital Maturity for N=147

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Digital Maturity	.065	147	.200*	.980	147	.030

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 2
Normality for Independent Variable for N=147

	Kolmogorov-Smirnov[a]			Shapiro-Wilk			Type of Distribution
	Statistic	df	Sig.	Statistic	df	Sig.	
Digital Maturity	.065	147	.200*	.980	147	.030	Normal
Innovation	.092	147	.004	.957	147	.000	Normal
Organizational Learning	.093	147	.003	.969	147	.002	Accepted as Normal
Leadership	.126	147	.000	.954	147	.000	Accepted as Normal with extended descriptive analysis

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Independent variable innovation yields a 0.004 significant level for K-S measurements indicating a wide distance from the estimated P>0.05 for normal distribution. For the independent variable Organizational Learning, the significant value of K-S provided a P of 0.003. Pearson, r correlation is used for linear distributed data whereas Spearman correlation

is for data that is not normally distributed. To improve the accuracy of data analysis, the Q-Q plot and histogram are reviewed to determine if the data is normally distributed as well as the linearity of measured data.

Descriptive Statistics

Four tests are analyzed under descriptive test namely the mean or average value of data, the standard deviation, the skewness, and the kurtosis. Standard deviation indicates how far is the spread of the data from the mean. Based on Field (2009), a low standard deviation indicates consistency hence standard deviation of less than a normal distribution of 1 is preferred. Skewness describes the asymmetrical curve across the mean, with an acceptable range of -3 to +3 whereas kurtosis points to the tail of the curve with an acceptable range of -10 to +10 (Griffin & Steinbrecher, 2013; Kline, 2013). A typical normal distribution would have a kurtosis of 3 and a Kurtosis lower than 3 indicates a slight thickening of the tail (Kallner, 2018).

The digital maturity construct consists of market capability, organization capability, and organization strategy. Digital Maturity indicated a reading of 3.8709 for the mean which is close to "Agree" at 4.0 and a standard deviation of <1 which indicates a small and acceptable variation. The skewness of the kurtosis indicates a good distribution curve based on the limits. The first variable construct, Marketing Capability has a mean of 3.9728 and a standard deviation of <1. Skewness and kurtosis show a solid distribution curve. The second variable construct Organization Capability has an average reading of close to "Agree" and strong distribution around the mean. The skewness is negligible with a kurtosis of good distribution based on limits. The third variable construct is Organization Strategy which has a mean of 3.7840 close to the "Agree" indicator and a standard deviation <1. The skewness is inexistent, and kurtosis is well within the limit. All in all, Digital Maturity and its variable construct indicate a good distribution.

Table 3
Descriptive Analysis of Digital Maturity and its construct

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Skewness Std.Error	Kurtosis	Kurtosis Std. Error
Digital Maturity	147	2.40	5.00	3.8709	.57882	.122	.200	-.447	.397
Market Capability	147	2.50	5.00	3.9728	.66475	-.172	.200	-.626	.397
Org Capability	147	2.20	5.00	3.8558	.62758	.094	.200	-.526	.397
Org Strategies	147	1.75	5.00	3.7840	.67339	.049	.200	-.254	.397

Leadership is an independent variable with two sub-variables capabilities and competency. Leadership as an independent variable has a mean reading of 3.9201 indicating closeness to "Agree" at 4.0. The standard deviation is <1. The skewness and the kurtosis are well within the limit of a good distribution curve. For the first sub-variable, capabilities, the mean value is on the high end of "Agree" with a value of 3.9728, and the standard deviation is less than 1. Skewness and kurtosis indicate closeness to a normal distribution. For the second sub-variables, competency, the mean value is also on the high end leaning towards "Agree" and a standard deviation of <1 Skewness is small at -0.154, with kurtosis well within the limit. All in all, the Leadership independent variable and its sub-variables capabilities and competency has a good distribution curve.

Table 4
Descriptive Statistics for Leadership

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Skewness Std. Error	Kurtosis	Kurtosis Std. Error
Leadership	147	2.00	5.00	3.9201	.67425	-.213	.200	-.233	.397
Capabilities	147	1.00	5.00	3.9728	.71859	-.591	.200	1.015	.397
Competencies	147	2.00	5.00	3.8673	.75017	-.154	.200	-.493	.397

Innovation as an independent variable has a mean reading close to "Agree" and with a small standard deviation of <1. The skewness is negligible, but the kurtosis indicated a slight thickening on the positive tail. There are two sub-variables under it which are Sustainable Innovation and Breakthrough Innovation. For the first sub-variable which is Sustainable Innovation, the mean is leaning toward the "Agree" scoring with a low standard deviation of less than 1. The skewness indicates a symmetrical curve whereas the tail of the curve is at an acceptable range of under +10 but with a slight thickening of the tail of the graph. The second sub-variable is a breakthrough innovation which has a mean leaning towards "Agree" and standard deviation <1. The skewness is within an acceptable range, however, with a smooth non-thickening kurtosis at 0.232. All in all, the innovation construct has a good distribution, however, its kurtosis and sustainable innovation are leaning towards the positive thickening of the tail but well within the acceptable limit.

Table 5
Innovation – Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation	Skewness	Skewness Std. Deviation	Kurtosis	Kurtosis Std. Deviation
Innovation	147	1.33	5.00	3.9218	.66332	-.516	.200	1.089	.397
Sustainable Innovation	147	1.00	5.00	3.9184	.73050	-.668	.200	1.298	.397
Breakthrough Innovation	147	1.67	5.00	3.9252	.71172	-.426	.200	.232	.397

Organizational Learning indicates a mean leaning towards “Agree” with a small deviation. The skewness indicates a symmetrical curve and kurtosis indicates a non-thickness of the tail. Organizational Learning is broken down into two sub-variables which are knowledge management and learning culture. Knowledge management has a mean indicating an “Agree” and a standard deviation lesser than 1. Skewness is small whereas Kurtosis is not evident. In comparison to prior research by Kieser (2017), the mean is at 4.023 which is average, and a lower standard deviation of 0.579. The difference is the sample of 127 compared to this research’s sample size of 147. The second sub-variable is Learning Culture which has a mean standard deviation indicating above-average results on average reading with a distribution of small discrepancies. The skewness is low bringing it close to a symmetrical distribution. The Kurtosis indicates the absence of thickening of the tail. Based on a similar study conducted in South Africa, the average reading for learning culture was lower at 2.879 indicating below average, with a small variety of standard deviation of 0.790. Overall, organizational learning indicates a mean reading of “Agree” with a very small standard deviation. The distribution curve is symmetrical with the absence of thickening of the tail.

Table 6
Organizational Learning – Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Skewness Std. Error	Kurtosis	Kurtosis Std. Error
Org Learning	147	2.00	5.00	3.9643	.66667	-.267	.200	-.368	.397
Knowledge Management	147	2.00	5.00	4.0680	.67679	-.461	.200	-.040	.397
Learning Culture	147	2.00	5.00	3.8605	.77146	-.316	.200	-.210	.397

Reliability and Validity

Based on a study done by Lee Cronbach (1951) called the Coefficient alpha, the value of alpha provides an estimate of the reliability and consistency of the results produced. Cronbach's Alpha considers undiscovered variables such as a person's thought process and neurosis contribution, conscientiousness, and emotions as well as openness to a questionnaire. An alpha coefficient with a value less than 0.5 is deemed unacceptable, and a value above 0.9 is deemed excellent. This research carried 30 questions under the contracts with a five-point Likert scale. From the figure below, Cronbach's alpha is 0.966 which is at an excellent level, and the questionnaires are concluded as reliable, consistent, and valid.

Table 7
Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.966	.966	30

Factor Analysis

Factor analysis is used to identify collinearity when one independent variable is highly correlated to another. Kaiser-Meyer-Olkin indicates the amount that varies in the independent variables due to unmeasured factors. A value close to 1 is desirable and a value less than 0.50 indicates the questions would be unsuitable. From the SPSS analysis, for 30 questions under 9 sub-variables representing dependent and independent variables construct, the value attained is 0.936 which is a strong indication of solid questions. From a prior study done by Kieser (2017), the KMO value obtained varies between 0.808 and 0.937 for different variable constructs. Bartlett's Test of Sphericity identifies the consistency of variance for all constructs with a requirement to have a significant level *P* less than 0.05. From the analysis, this value is achieved across all questions and constructs. The same is observed in the prior research conducted in South Africa by (Keiser, 2017).

Table 8
Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.936
Bartlett's Test of Sphericity	Approx. Chi-Square	3322.438
	df	435
	Sig.	0.000

Eigenvalue identifies vector reduction using scalar values, to measure simpler operations. If all three independent variables achieve a value of more than 1, then the criteria are met (Field, 2009). A minimum of five components can be extracted which is will encompass the 3 independent variables, the total extraction sums of squared loadings are 1.076 which is higher than the value of one, hence the condition is met. At the third component, the sum of square loading is 1.409 which is again higher than the minimum condition of one. Based on the visual assessment of the Scree Plot the min limit is set at one and the 5 components are visible above the limits.

Correlation Analysis

Correlation Analysis identifies the relationship that exists between two datasets or continuous variables. The coefficient indicates how one variable move with the other. A positive correlation means both variables move in the same direction and a negative correlation is in the opposite direction. If the coefficient is +1, then it is synchronous movement. Pearson, r correlation is used for linear distributed data whereas Spearman correlation is used for non-parametric analysis. In this analysis, we will be using Pearson correlation only. There are several conditions to be met to use Pearson. The first is that the data is normally distributed and has a bell shape curve. The second is that both the variables measured are linear whereby it is homoscedastic along the regression line. Correlation analysis with Pearson coefficient *r* between 0.5 and 0.67 is considered moderately strong, and Pearson coefficient *r* above 0.7 is considered strongly correlated. The strength of the relation between a dependent and independent variable as well as an independent variable to another independent variable is measured using correlation analysis, which shows that one variable can impact the other either significantly or insignificantly. For results where Pearson's coefficient r is higher than 0.7, this shows both a positive and a strong correlation.

Dependent variable Digital Maturity has a strong and positive correlation with all independent variables; innovation, organizational learning, and leadership. The relationship between each sub-variable indicates a moderately strong and strong positive relationship based on Pearson's coefficient r. This indicates that values from 0.5 to 0.67 are considered moderate to strong in the positive direction and values above 0.67 are strong in the positive direction. A +1 indicated that both variables will synchronize and move in tandem.

Table 9
Correlation of Main Variables

		Digital Maturity	Innovation	Organizational Learning	Leadership
DigitalMaturity	Pearson Correlation	1	.784**	.754**	.770**
	Strength of Relationship		strong	strong	strong
Innovation	Pearson Correlation	.784**	1	.750**	.761**
	Strength of Relationship	.000		strong	strong
OrganisationalLearning	Pearson Correlation	.754**	.750**	1	.812**
	Strength of Relationship	strong	strong		strong
Leadership	Pearson Correlation	.770**	.761**	.812**	1
	Strength of Relationship	strong	strong	strong	

**. Correlation is significant at the 0.01 level (2-tailed).

Market Capabilities indicate a strong and positive relationship with Organisational Capabilities and Leadership Capabilities. This shows that with a good market conversion of digital maturity, capabilities in an organization will follow suit, and with capable leaders, the market capability will improve. Sustainable innovation shows a strong correlation with organizational strategies. With good strategies, innovation in a company will be continuous. An organizational strategy is strongly influenced by the knowledge management of the company. It will in turn strongly influence the leadership capabilities and organizational capabilities. A sequence of flow or pattern deduction could be leveraged by first positively increasing knowledge management that strongly correlates with organizational strategy. This organizational strategy will in turn positively move organizational capabilities, sustainable innovation, and leadership capabilities.

Table 11
Correlation between sub-variable constructs

	Market Capability	Org Capability	Org Strategies
Market Capability		strong	moderate
Org Capability	strong		strong
Org Strategies	moderate	strong	
Sustainable Innovation	moderate	moderate	strong
Breakthrough Innovation	moderate	moderate	moderate
Capabilities	strong	moderate	strong
Competencies	moderate	moderate	moderate
Learning Culture	moderate	moderate	moderate
Knowledge Management	moderate	moderate	strong

**. Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis

Model Summary evaluates the strength of the model, whereby the model is $Y = X_0 + X_1B_1 + X_2B_2 + X_3B_3$, Y is represented by the dependent variable, and X is represented by the independent variables. The cumulative impact of each independent variable will potentially vary digital maturity in an organization. The value of R, better known as the multiple correlation coefficient, is the correlation factor that connects observed and predicted values. The higher the R is, the stronger this relationship and the lesser room for errors. R squared is to provide the percentage of the model fitness and will be a vector unit. The desirable value of R square is to be 100%, and anything more than 70% is considered a fit model. From the analysis, the value obtained is 70.1% which is an accepted range. This shows that 70.1% of the variance in the dependent variable from the independent variable which is the regressor is included in this model. In simple terms, the relationship is 70.1% covered and hence it is a fit model. A similar study conducted in South Africa by Kieser (2017) indicated an unfit model of less than 50% by dependent variable construct.

Table 11
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.837[a]	.701	.694	.32005	2.067

a. Predictors: (Constant), Organisational Learning, Innovation, Leadership
b. Dependent Variable: Digital Maturity

The Durbin-Watson test is used to identify if the datasets have autocorrelation. Autocorrelation is the self-correlation of data, instead of the independent variable impacting the dependent variable or a series of the accurate prediction model and observed data. Typically, this model will take a range of 0 to 4, and a value of 2 represents no autocorrelation. A value of less than 2 is positive autocorrelation and more than 2 is a negative correlation. Ideally, the goal is to keep it between 1.5 and 2.5 (King and Harris, 1995; White, 1992). From the table above, the Durbin-Watson test yields 2.032, which is close to 2 indicating that this model has no first-order autocorrelation. A similar study conducted in South Africa by Kieser

(2017) indicated Durbin Watson in the 1.9 range or 2.2 range which is close to 2 with slight edging.

Multicollinearity is used to determine if independent variables are affecting each other. A highly intercorrelated independent variable will impact the variance of coefficients hence not yielding an accurate contribution of each independent variable to the dependent variable. For this test, each independent variable is rotated as a dependent variable and tested against the other two independent variables. To determine that the independent variables are not highly correlated to each other, Variance Inflation Factor (VIF) is tested. If VIF is more than 5 to 10, then multicollinearity is present (Kim, 2019). From the analysis below, VIF is within 2.282 to 2.94 which indicates that the value is within the required limits, hence multicollinearity is non-existent between independent variables. As a basis of comparison, a similar study conducted in South Africa (Keiser, 2017) is referred to and the VIF is between 1.56 to 2.39.

Table 12
Multicollinearity of Independent Variable

Dependent Variable	Independent Variable	Tolerance	VIF
Innovation	Leadership	.258	2.940
	Organizational Learning	.258	2.940
Leadership	Organizational Learning	.320	2.282
	Innovation	.320	2.282
Organisation Learning	Innovation	.315	2.372
	Leadership	.315	2.372

Homoscedasticity measures the consistency of error across the dataset obtained. . This error could be random abruptions that impact the relationship between the independent and dependent variable. The expectation is for the error residual to have approximately the same level across the regression line (Field, 2009, p. 220). Homoscedascity is done through visual inspection. Based on Appendix E, the error residual is scattered across the regression line without an approximately equal distance from the regression line. 2 other conditions are verified, the first is to ensure that the maximum dispersion from regression is below 1.5 (Salkind, 2010). This condition is met. The second is to ensure the residual is within -3 and 3. Based on the standard residual from Table 20 below, the minimum is at -2.950 and the maximum at 2.318 hence it is within the limit. Based on this, the readings indicate homoscedasticity which ascertains the linearity of the measurement.

Table 13
Standard Residual

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.3745	4.7115	3.8709	.48446	147
Residual	-.94406	.74201	.00000	.31675	147
Std. Predicted Value	-3.089	1.735	.000	1.000	147
Std. Residual	-2.950	2.318	.000	.990	147

a. Dependent Variable: Digital Maturity

ANOVA is used to study the influence of an independent variable on a dependent variable through both systematic and random factors. The prior assumptions made to conduct the ANOVA test are that the population variance must be scattered equally (homoscedasticity) and samples must be independent among some. In a null hypothesis condition, the significant level will indicate 1. The significant value, p-value close to zero indicates the model is against the null hypothesis. A p-level less than 0.05 is considered a healthy and fit model. Based on the analysis run, the significant level is extremely low at 0.000 hence this model of independent variables and the dependent variable is good and fit. A comparison study made in South Africa by Kieser (2017) indicated similar values.

Table 14
ANOVA and Significant Level

	Sum of Squares	df	Mean Square	F	Sig.
Regression	34.267	3	11.422	111.511	.000[b]
Residual	14.648	143	.102		
Total	48.915	146			

a. Dependent Variable: Digital Maturity
b. Predictors: (Constant), Organisational Learning, Innovation, Leadership

The coefficients obtained from multiple regression analysis indicates the contribution percentage of each of the independent variable. The ideal model of the dependent variable and independent variables $Y = X_0 + X_1B_1 + X_2B_2 + X_3B_3$, and Y is represented by the dependent variable, and X is represented by the independent variables (Bobko, 2001). X_1 represents Innovation, X_2 represents leadership, X_3 represents organizational learning. The final model obtained is

$$Y = 0.777 + 0.400X_1 + 0.286X_2 + 0.221X_3 \quad (1)$$

Based on this study, Innovation has a 40% impact on digital maturity in an organization. Leadership and Organisational Learning have a smaller contribution of 28.6% and 22.1% respectively. Based on the study conducted by Kieser (2017) in measuring the Digital Maturity of Organisations in South Africa, the contribution of the independent variable to all digital maturity constructs is less than 10%.

Table 15
Regression Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.777	.172		4.529	.000
Innovation	.349	.066	.400	5.326	.000
Leadership	.245	.073	.286	3.346	.002
Organizational Learning	.192	.073	.221	2.647	.001

Dependent Variable: DigitalMaturity

Summary of Hypothesis

Table 16

Summary of Hypothesis Test Table

Hypothesis	Sig.Value (P≤0.05)	Standardized Beta Coefficient	Result	Interpretation
H1: There is a significant relationship between leadership and the digital maturity of an organization	0.001	0.286	Accepted	The beta coefficient value of 0.286 is an indication that it has a positive impact on digital maturity by 28.6%. It is concluded that leadership has a significant impact on digital maturity
H2: There is a significant relationship between innovation and the digital maturity of an organization	0.000	0.400	Accepted	The beta coefficient value of 0.400 is an indication that it has a positive impact on digital maturity by 40.0%. It is concluded that innovation has a significant impact on digital maturity
H3: There is a significant relationship between organizational learning and the digital maturity of an organization	0.009	0.221	Accepted	The beta coefficient value of 0.221 is an indication that it has a positive impact on digital maturity by 22.1%. It is concluded that organizational learning has a significant impact on digital maturity

Based on Table 16 above, all hypotheses are accepted based on the significant level, P≤0.05. The standardized coefficient indicates a positive and significant impact with innovation having the highest impact of 40% on digital maturity, followed by the variable leadership at 28.6% and organizational learning at 22.1%. Figure 4.7 below indicates the validated model between independent variables innovation, leadership, and organizational learning and the dependent variable digital maturity in Malaysia.

Conclusion

Individual relationships between innovation, leadership, and maturity were explored in this report. The findings of this study showed that we were able to achieve the goals set out for this study and contribute to the understanding of digital maturity through empirical analysis. The primary factor influencing digital maturity was discovered to be innovation.

Relationship between Leadership and the Digital Maturity of an Organization

The study found a strong and positive correlation between Leadership and Digital Maturity, with moderate correlations between sub-variables. Independent variable reliability and

validity were excellent, and there were no collinearity issues. Although the regression model was healthy, only 28.6% of leadership impacted Digital Maturity. Therefore, the study rejected the null hypothesis and accepted the alternate hypothesis, demonstrating a statistically significant positive association between Leadership and Digital Maturity.

Correlation between Leadership and Digital Maturity	Strong and Positive Correlation
Correlation between sub-variable of Leadership and Digital Maturity : Leadership Capability and Leadership Competency against the Digital Maturity construct; Market Capability, Organization Capability, and Organization Strategy	Moderate and Positive Correlation
Reliability of Independent Variables	Excellent
Validity of Independent Variables	Excellent
Collinearity between independent variables	Non-Existent
Durbin-Watson analysis (first-order correlation)	Non-Existent
Anova of the regression coefficient	Healthy ($p < 0.05$)
The Impact of Leadership on Digital Maturity (based on regression coefficient)	28.6%
Null hypothesis (H_o)	Rejected
Alternate Hypothesis (H_1) : There is a significant relationship between Leadership and the Digital Maturity of an Organization	Accepted

Relationship between Innovation and the Digital Maturity of an Organization

The correlation study found a strong and positive correlation between Innovation and Digital Maturity, with both strong and moderate correlations between sub-variables. Independent variable reliability and validity were excellent and there were no collinearity issues. The regression model was healthy, with 40% of innovation impacting Digital Maturity. Therefore, the study rejected the null hypothesis and accepted the alternate hypothesis, demonstrating a statistically significant positive association between Innovation and Digital Maturity.

Correlation between Innovation and Digital Maturity	Strong and Positive Correlation
Correlation between sub-variable of Innovation and Digital Maturity : Sustainable Innovation and Breakthrough Innovation against Digital Maturity Construct; Market Capability, Organization Capability, and Organization Strategy	Strong, Moderate, and Positive Correlation
Reliability of Independent Variables	Excellent
Validity of Independent Variables	Excellent
Collinearity between independent variables	Non-Existent
Durbin-Watson analysis (first-order correlation)	Non-Existent
Anova of the regression coefficient	Healthy ($p < 0.05$)
The Impact of Innovation on Digital Maturity (based on regression coefficient)	40%
Null hypothesis (H_o)	Rejected
Alternate Hypothesis (H_1) : There is a significant relationship between Innovation and the Digital Maturity of an Organization	Accepted

Relationship between Organizational Learning and the Level of Digital Maturity of an Organization

The correlation study found a strong and positive correlation between Organizational Learning and Digital Maturity, with moderate correlations between sub-variables. Independent variable reliability and validity were excellent, and there were no collinearity issues. The regression model was healthy, with 22.1% of Organizational Learning impacting Digital Maturity. Therefore, the study rejected the null hypothesis and accepted the alternate hypothesis, demonstrating a statistically significant positive association between Organization Learning and Digital Maturity.

Correlation between Organizational Learning and Digital Maturity	Strong and Positive Correlation
Correlation between sub-variable of Organizational Learning and Digital Maturity: Knowledge Management and Learning Culture against Digital Maturity Construct; Market Capability, Organization Capability, and Organization Strategy	Moderate and Positive Correlation
Reliability of Independent Variables	Excellent
Validity of Independent Variables	Excellent
Collinearity between independent variables	Non-Existent
Durbin-Watson analysis (first-order correlation)	Non-Existent
Anova of the regression coefficient	Healthy ($p < 0.05$)
The Impact of Organizational Learning on Digital Maturity (based on regression coefficient)	22.1%
Null hypothesis (H_o)	Rejected
Alternate Hypothesis (H_1) : There is a significant relationship between Organizational Learning and the Digital Maturity of an Organization	Accepted

Significance of This Study

This study has significant implications for Malaysian government ministries and consulting firms working to improve the country's level of Digital Maturity. By identifying segmentation within the industries, such as SMEs, medium, and large industries, and highlighting specific areas for improvement such as Innovation, Leadership, and Organizational Learning, this research can aid in implementing targeted digitization projects. Additionally, the results can serve as a foundation for future investigations into the impact of Digital Maturity across various sectors as well as a basis for other developing countries.

Limitations

This study had certain limitations, including a restricted timeframe that limited the possibility of a larger sample size. Another limitation was that it was localized to Malaysia, and resources were lacking for further analysis such as differentiating industry segments and their impact on Digital Maturity. Additionally, the study relied on the perceptions of employees, which may have increased accuracy if focused on strategic decision-makers such as CEOs or CTOs within organizations.

Recommendation

This research can be used as a reference or an embodiment for further research. Some future research recommendations include identifying Digital Maturity by industry size as innovation may play a large role in small and medium industries. This is taking into consideration the accessibility and different groups of respondents' participation, as all employees participate in innovation for small and medium companies, but for large companies, this might be only visible to employees who are in the research and development division or strategy development sectors. The second recommendation is to segregate this research by industry to see which industry is impacting the normal distribution of data. Furthering to this, it would be good to investigate other potential variables to determine a moderating hypothesis. To leverage this study onto other countries, country-specific adaption must be conducted to cater to the country's nature of governance, implementations, and adoption of Digital Maturity.

References

Bobko, P. (2001). Correlation and regression: Applications for industrial-organizational psychology and management (2nd ed.). Thousand Oaks, California. Sage Publication.

Cacioppe, R. (1998). Leaders developing leaders: An effective way to enhance leadership development programs. Leadership & Organization Development Journal. 19. 194-198. 10.1108/01437739810217179.

Covid will spur the digital transformation of Malaysia's SMEs. (2020). Malaysia Kini. Retrieved from https://www.malaysiakini.com/advertorial/534698 Covid-19 - a game-changer for digital transformation, according to EY. (2020, June 1). Ernst and Young. Retrieved from https://www.ey.com/en_my/news/2020/06/covid-19-a-game-changer-for-digital-transformation-according-to-ey

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika 16, 297–334. https://doi.org/10.1007/BF02310555

Field, A. (2009). Discovering Statistics Using SPSS. 3rd Edition, Sage Publications Ltd., London.

Fitzpatrick, M., Gill, I., Libarikian, A., Smaje, K., & Zemmel, R. (2020). The digital-led recovery from COVID-19: Five questions for CEOs. McKinsey Digital. Retrieved from https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-digital-led-recovery-from-covid-19-five-questions-for-ceos

Griffin, M. M., & Steinbrecher, T. D. (2013). Large-Scale Datasets in Special Education Research (Chapter 4), International Review of Research in Developmental Disabilities, Academic Press, Volume 45 (pp 155-183), ISSN 2211-6095, ISBN 9780124077607, https://doi.org/10.1016/B978-0-12-407760-7.00004-9.

Higgs, M., & Rowland, D. (2000). Building change leadership capability: The quest for change competence. Journal of Change Management, 1:2, 116-130, DOI: 10.1080/714042459

Huang, J., Henfridsson, O., Liu, M. J., & Newell, S. (2017). Growing on steroids: Rapidly scaling the user base of digital ventures through digital innovation. MIS Quarterly, 41(1), 301–314.

Johnson, W. (2017). Leading Remotely. MIT Sloan Management Review. Retrieved October 31, 2019, from https://sloanreview.mit.edu/article/leading-remotely/

Johnston, R., and Hawke, G. (2002). Case Studies of Organizations with Established Learning Cultures. National Centre for Vocational Education Research, Adelaide. ISBN 1 74096 028 9. Retrieved from: https://www.ncver.edu.au/research-and-

statistics/publications/all-publications/case-studies-of-organisations-with-established-learning-cultures

Kalner, A. (2014). Formulas. (pp 1-119). Stockholm. Laboratory Statistics, Elsevier. https://doi.org/10.1016/B978-0-12-416971-5.00002-0.

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2016). Aligning the organization for its digital future. MIT Sloan. https://sloanreview.mit.edu/projects/aligning-for-digital-future

Kane, G. C., Palmer, D., Phillips, A., & Kiron, D. (2015). Is your business ready for a digital future?MIT Sloan Magazine Summer Big Idea; Digital Leadership Research Feature. https://sloanreview.mit.edu/article/is-your-business-ready-for-a-digital-future/

Kieser, H. (2017). The influence of digital leadership, innovation and organisational learning on the digital maturity of an organization. Gordon Institute of Business Science, University of Pretoria.

Kim J. H. (2019). Multicollinearity and misleading statistical results. Korean Journal of anesthesiology, 72(6), 558–569. https://doi.org/10.4097/kja.19087

Kline, R. B. (2013). Beyond significance testing: Statistics reform in the behavioural sciences (2nd ed.). American Psychological Association. https://doi.org/10.1037/14136-000

Knofczynski, G. T., & Mundfrom, D. (2008). Sample sizes when using multiple linear regression for prediction. Educational and Psychological Measurement, 68(3), 431– 442. doi:10.1177/0013164407310131

Kohli, R., & Melville, N. P. (2019). Digital innovation: A review and synthesis. Information Systems Journal, 29, 200 - 223. Retrieved from https://doi.org/10.1111/isj.12193

Ferry, K. (2018). Digital leadership in Malaysia; The long way to digitally sustainable leadership. Retrieved from https://focus.kornferry.com/wp-content/uploads/2015/02/Korn-Ferry-Digital-leadership-in-Malaysia.pdf

Liang, L. H. (2020). How Covid-19 led to a nationwide work-from-home experiment. The BBC. Retrieved March 9, 2020, from https://www.bbc.com/worklife/article/20200309-coronavirus-covid-19-advice-chinas-work-at-home-experiment

Lin, Y., & Wu, L.Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. Journal of Business Research. 67. 407–413. 10.1016/j.jbusres.2012.12.019.

McMillan, J. H., & Schumacher, S. (2010). Education research: evidence-based inquiry (7th ed.). New Jersey. Pearson.

Mortensen, P. S., and Bloch, C. W. (2005). Oslo manual guidelines for collecting and interpreting innovation data: proposed guidelines for collecting and interpreting innovation data. Organisation for Economic Cooperation and Development, OECD.

Peteraf, M. A. (1993). The Cornerstones of competitive advantage: A resource-based view. Strategic Management Journal, 14(3), 179–191. http://dx.doi.org/10.1002/smj.4250140303

Regenysys. (2020). The Fifth Industrial Revolution (5IR) and how it will change the business landscape. Reginsight. Retrieved on Sep 8, 2020, from https://insights.regenesys.net/the-fifth-industrial-revolution-5ir/

Rossmann, A. (2019). Digital Maturity: Conceptualization and Measurement Model. Conf: Bridging the Internet of People, Data, and Things: 39th International Conference on Information Systems (ICIS)

Satell, G. (2017). The 4 types of innovations and the problems they solve. Harvard Business Review. https://hbr.org/2017/06/the-4-types-of-innovation-and-the-problems-they-solve

Saunders, M., & Lewis, P. (2012). Researching business and management. Harlow: Pearson.

Sinha, S. (2016). Managing an ambidextrous organization: balancing innovation and efficiency. Strategic Direction, Vol. 32 No. 10, pp. 35-37. https://doi.org/10.1108/SD-05-2016-0061

The study finds that only 3% of Malaysian businesses are digital leaders. (2018). Advertising + Marketing magazine Malaysia. Retrieved October 25, 2018, from https://www.marketing-interactive.com/study-finds-that-only-3-of-malaysian-businesses-are-digital-leaders

Teece, D., and Pisano, G. (1994). The Dynamic Capabilities of Firms: An Introduction. Industrial and Corporate Change. 3(3):537-556. DOI: 10.1093/icc/3.3.537-a

Tong, A., & Gong, R. (2020). The impact of COVID-19 on SME digitalisation in Malaysia. Khazanah Research Institute. Retrieved from https://blogs.lse.ac.uk/seac/2020/10/20/the-impact-of-covid-19-on-sme-digitalisation-in-malaysia/

White, K. (1992). The Durbin-Watson Test for Autocorrelation in Nonlinear Models. The Review of Economics and Statistics. 74(2), 370-373. doi:10.2307/2109675

Williams, P., & Sullivan, H. (2011). Lessons in leadership for learning and knowledge management in multi-organisational settings. The International Journal of Leadership in Public Services, 7(1), 6–20. doi:10.5042/ijlps.2011.0089

Wojcik, P. (2015). Exploring Links Between Dynamic Capabilities Perspective and Resource-Based View: A Literature Overview. International Journal of Management and Economics. 45. 83-107. 10.1515/ijme-2015-0017.

World Bank. (2021). Malaysia's Digital Economy – A new driver of development. Retrieved from https://www.worldbank.org/en/results/2021/06/25/malaysia-s-digital-economy-a-new-driver-of-development

89% of Malaysians need to upskill to work in a digital environment: Randstad work to monitor research. (2018). Randstad. Retrieved from https://www.randstad.com.my/about-us/news/89-of-malaysians-need-to-upskill-to-work-in-a-digital-environment-randstad-workmonitor-research/