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Digital Supply Chain Exploration (DSC) in Rural and Sub-Urban Livestock Ventures

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Abstract

In both the domestic and global markets, the rapid development of the digital economy has become a major distraction. As well as middle economic units that bear business risks, small and medium enterprises (SMEs) are also affected. Nonetheless, SMEs can take advantage of the disruption in order to compete with large, industrial businesses rather than invest overseas. Amidst a very gloomy economic climate, digitalization is considered one of the best alternatives and suggestions to ensure that businesses can survive. Agricultural and livestock sectors, especially micro-farmers in suburban and rural areas, have been hardest hit. As well as the challenges they have long faced with digitalization, the number of products they require has decreased drastically as well. From this point of departure, this study is conducted to assess the readiness of micro-farm entrepreneurs (MLEs) towards digitalization embrace digitalization

and examine the impact of digital adoption on their business operations. A random sampling method was employed on the MLE in various sub-towns in Selangor, namely Kuala Selangor, Sabak Bernam and Hulu Selangor, from 2020 to 2021. Using the method of analysis, instruments are verified and coefficients tested. The results showed that MLEs are using digital platforms to promote their products and connect with their business ecosystem. In spite of this, they face the challenge of ensuring further improvements to their infrastructure and the capabilities of digitalization in contributing to value without posing high risks or costs. This study suggests that further studies have to look at and evaluated rural entrepreneurs using a triangulation approach of data and broader subjects.

Keywords: digitalization, supply chain, micro-entrepreneur, micro-breeding

1. Introduction

A growing population and global warming that is causing climate change as well as global geographic climate conditions present challenges to securing food supplies. Asia is one of the most poor and unemployed countries in the world, as protein sources like meat and fish are scarce. Agricultural production is one of the main sources of food, income, and livelihood for the majority of Asians. The micro-farm sector therefore plays a significant role in improving the economic status of the rural poor. Small farmers in the region raise livestock to obtain energy resources, feed, cash income, and organic fertilizers. A lack of industrial scale poultry and meat production always leads to an unstable price, as well as a limited supply of ruminant land. As a result of high feed costs for poultry and meat production in high-scale production, Asia, especially those in ASEAN countries, are experiencing a significant rise in livestock breeding. The majority of these interventions focus on cultivating household gardens, communal gardens, and agriculture. Providing affordable and nutritious food to the community is one of the survival strategies of this intervention. Food security and the national security agenda will be undermined if the agricultural sector is not preserved. Malnutrition, especially among the B40 group (B40 refers to income groups in Malaysia, who represents the bottom 40% of Malaysia household income. They earned less then RM 4850 per month) and be triggered by domestic food safety issues. In addition, digitalization challenges arising from the development of IR 4.0 technology disrupted the business ecosystem in a dramatic way. Lack of technology can lead to a gap in the abilities of businesses, especially small and medium-sized businesses. It is therefore the objective of this study to determine whether farmers and micro-farmers (hereinafter MLE) are prepared to work in the ecosystem of livestock suppliers in rural and urban areas. Using survey forms, the study was conducted in rural and suburban areas of Selangor.

1.1 Importance of the Problem

Any third world country has relied heavily on food safety support through a variety of government strategies. As a result, these countries are characterized by high unemployment, poverty, high birth rates, and chronic diseases, which make it difficult for them to access affordable food. Through a variety of interventions, food strategies have been developed and implemented. As a result of increased livestock breeding and the growth of farmers in Asia, prices have stagnated and poverty has increased. To deal with the food crisis of 2007-2008, which affected other countries and rice importers in Asia, livestock meat options were being produced. Consequently, many South Asian countries began to increase domestic production and reduce imports. Due to the changing needs of consumers in the market, poultry farming has started growing rapidly in Malaysia in the past 10–12 years, despite being a relatively new industry. Due to the unmatched demand for poultry and fish, low consumer awareness, and the low availability of unbuilt industrial livestock breeding facilities designed to maximize profitability and resource consumption, industrial-scale cattle breeding remains less popular. A review of literature for the livestock industry in Malaysia, along with the application of sustainability, cost savings, and supply chain models to LMEs, will be presented in this paper.

As a result of business digitization, one of the biggest challenges for businesses today is

ensuring that their supply chains are effective, especially after a pandemic. The LME usually lags behind in the development and utilization of its technology when compared with the industry and packaged finished goods, which are ready to sell. The LME production chain consists of input suppliers of either livestock and genetic companies for LME farmers for meat purposes, slaughterhouses/cutters, distributors, wholesalers, and retailers, or retailers only, and ultimately consumers. Typically, the LME negotiates terms and prices with slaughterhouse managers who pay them according to the country's commodity exchanges. Processors often work with slaughterhouses. This caused prices to decline and not be comparable to the cost of raising livestock, a relatively long period of agricultural time from the poultry-based industry (Ibrahim, 1991). Since the livestock industry in Malaysia is still very new, the government has provided many campaigns and incentives in order to develop it as a downstream and micro industries. Historically, digitization has taken place in four stages, according to Schüritz et al. (2017), Björkdahl (2020), the first being data access within the old business model. A second stage is the emergence of product development that is integrated with the digital platform as part of the integrated business model (Gierlich et al., 2019). Peltoniemi and Vuori (2004) found that background and capabilities of SMEs played the biggest role in determining the success of DSC adoption in Malaysian businesses, along with a number of other challenges affecting patterns and behaviors (Peltoniemi & Vuori, 2004). SMEs can become independent at the third stage by integrating DSC into their products and services. According to Boschma and Alvedalen (2017), SMEs are still in their infancy when it comes to digitalization, and many obstacles and gaps must be refined through research and preparation of the DSC structure (Boschma & Alvedalen, 2017). The purpose of this study is to address this issue. In addition to identifying elements of entrepreneurial resources that SMEA has a broad range of backgrounds and capabilities, this paper will examine how those resources can be optimized in the integration of DSCs. In addition to bridging the research gap, it serves as a basis for further research in a wide range of entrepreneurship topics. Based on the Schüritz (2017) digitalization model, this study links level 1 and ranks 2nd in the digitalization framework map.

Another study by Patterson, Grimm, and Corsi (2004) found that technology has contributed significantly to supply chain management, including the introduction of this technology into an important functional area. The study examines the technologies related to the exchange of information and to the relationship between data supply activities within an organization within a supply chain system. Patterson et al. (2004) analyze how emerging technologies have led to the development and improvement of supply chain systems. Five functional technologies are now common to most supply chain systems. In addition to bar-coding technology, other systems are used to reduce manual labor costs by increasing productivity, increasing inventory efficiency, reversing product distribution, and enumerating products more quickly. The warehouse management system is used to manage space, equipment, employees, and other warehouse features efficiently to increase efficiency and performance. A supply chain ecosystem exchanges documents between supply chain ecosystems as part of electronic trading, including orders placed through strict networks, such as electronic data exchange or the internet. Modules, attachments, and domestic and industrial instruments are also sketched with computer-assisted design technology. Without altering product tags or item details, radio

waves can be used to move, distribute, and update information throughout a supply chain. Due to the increased rate of information sharing between organizations (Lenkenhoff et al., 2018), this technology has reduced costs and improved operational performance and productivity in the supply chain system.

1.2 Conceptual and Hypothetical Framework

The rapid development of the digital economy has become the main agenda in the development of industry (Gierlich et al., 2019). Simultaneous advances in the field of the Internet of Things (IoT), Big Data analysis, computing, and artificial intelligence (AI) will fundamentally transform economic activity in terms of operations and culture of consumers, governments, and societies facing these challenges, the country needs to create conditions conducive to the implementation of network services and infrastructure for traders, especially to SMEs in being competitive through digital platforms (Sidorenko & Khisamova, 2020). Whereas business owners and entrepreneurs also need to be mentally prepared, management, business operations, and their approach in business.

The five cores are the catalysts for digitalization, especially in the agricultural sector (Kosareva et al., 2019; Panetto et al., 2020; Ridha & Revelation, 2017), include amongst others: 1) Digitalization of technological and production processes related to multi-thing internet platforms, robotization, and production automation, etc. This is at the core of improving the operational capabilities of businesses capable of being in digital competition. But for, the digitization of this process is a very difficult stage to realize without the central ecosystem that operates business platforms in the internet. Without a digital platform, it is very expensive and has risks, especially for SMEs. 2) Development of a digital platform that can complement inter-industry transactions and operations and management of agricultural production into the multidimensional space of the digital ecosystem, 3) Development of digital management systems in livestock operations and marketing to optimize the composition and structure of information resources, provide open access, and develop tools that ensure the implementation of a set of tasks for the management system of agricultural production, 4) Develop information processing infrastructure, increase the reliability of communication channels and the speed of information transfer, the availability of information and communication technologies, and 5) Increased digital capabilities in the interaction of information with all units of business systems and services, as well as the widespread use of e-commerce.

Therefore, with the expectation that these five stages are used in MLE operations, three basic hypotheses will be evaluated based on the potential for digitalization, digitalization readiness, and their impact on MLE performance:

Ho1: The Internet platform has been used by MLEs to improve the effectiveness of their operations *and business performance.*

Ho2: The willingness of MLEs to develop digital supply chain platforms in their business operations affects business performance.

Ho3: The use of the MLE digital supply chain affects business performance.

Therefore, these five DSC cores will be used as MLE profit performance forecasters, as

shown in Table 1 below:

Table 1. MLE DSC theme forecaster coding

Do not	Questions	Code
1	I have used the internet platform in my business operations	**DSC1**
2	I used to use internet platforms in various business operations.	**DSC2**
3	I use the internet platform as one of the important strategic managements of the business	**DSC3**
4	I am ready to enhance digital capabilities for my business operations regardless of cost and risk.	**DSC4**
5	I interact with every unit of the market through a digital platform optimally.	**DSC5**
6	My business thrived with the advent of internet platforms.	**Performance**

2. Method and Sampling

The study is in the form of an exploratory factor analysis. This study is a descriptive statistic with a quantitative approach through factor verification analysis. This method of analysis allows researchers to generally study the initial model in a series of interrelated factors whose dependency relationship is in a set of constructions, represented by several variables while considering the measurement of errors (Hill, 1998). The data collection method is made through a questionnaire with a seven-point Likert closed question scale. This type of question is easy to analyze and pleasant for the respondent to answer the respondent should only choose one of the several answers given. Questionnaire type research is a popular form of research used among researchers because questionnaires can cover a variety of fields and can be easily designed (Ethics & Babatope, 2019). Through the questionnaire information related to the respondent can be kept confidential. This allows respondents to answer questions comfortably without feeling worried or anxious (Glasow, 2005).

The sampling of this study was determined through a simple random sampling method, using a survey form through a copy of a hard copy distributed to MLEs identified in several rural and sub-urban areas in Selangor covering the districts of Kuala Selangor, Sabak Bernam, and Hulu Selangor. Only these three areas are targeted in research due to two factors, it meets the locality characteristics and the type of industry required, as well as time and budgetary constraints by researchers. When setting the amount of sampling, the statistical strength method will be used with the software G * Power version 3.1.9.4. Survey forms are distributed through google forms, emails, and phone calls.

2.1 A Priori Power Nalysis

The statistical strength of a hypothetical test is the probability of detecting an effect if there is a true effect and correlation (Erdfelder et al., 1996). Strength analysis can be calculated and reported for statistical research surveys to gain as much confidence as possible, in the conclusions drawn from the results of the studies. It can also be used as a tool for estimating the number of observations or sample sizes needed to detect effects in surveys and experiments (Erdfelder et al., 2009). It provides an accurate sampling value with an estimate

of the size of the effect along with the power obtained, the strength of the relationship of the correlation between one variable and another, as well as obtaining significant sampling results. The generally accepted minimum power level is 0.80 (Cohen, 1988).

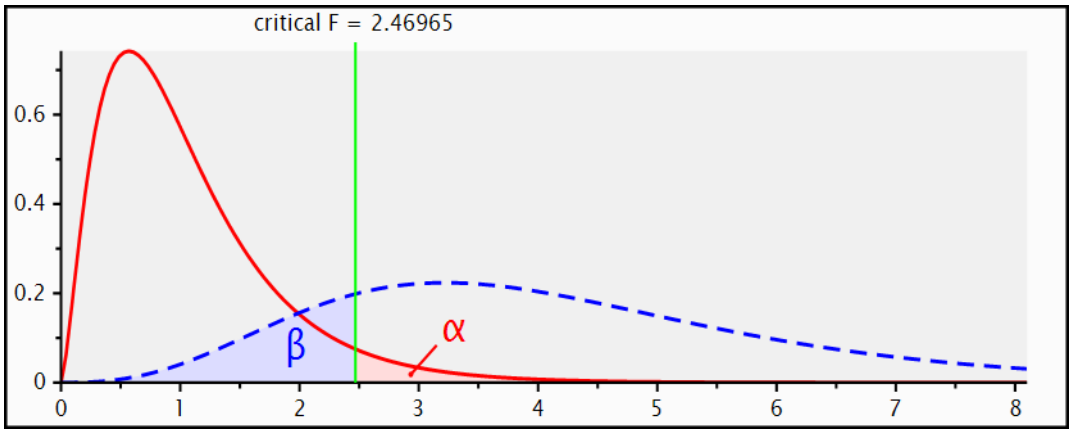

Figure 1. Power analysis curve by G * Power 3.1

In Figure 1 above is the result of power analysis by G * Power 3.1.9.4, w setting mode for test F, "Linear*Multiple Continuous Regression Model, R2 deviation from zero*", alpha = .05 and the proposed minimum power = 0.80. With the critical F expressed at the value F = 2.46965, this analysis using the d Cohen parameter (1988), the calculation of the effect size expressed for large values in double regression (0. 35) as a conclusion based on the degree of consistency of the R-Square value study found that the effect size for the field of entrepreneurship somewhat had a higher one than that expected (Connelly et al., 2010). It projected that the required sample size with this effect size is at least about n = 43 for batch in-comparison sampling, as shown in Figure 2 below:

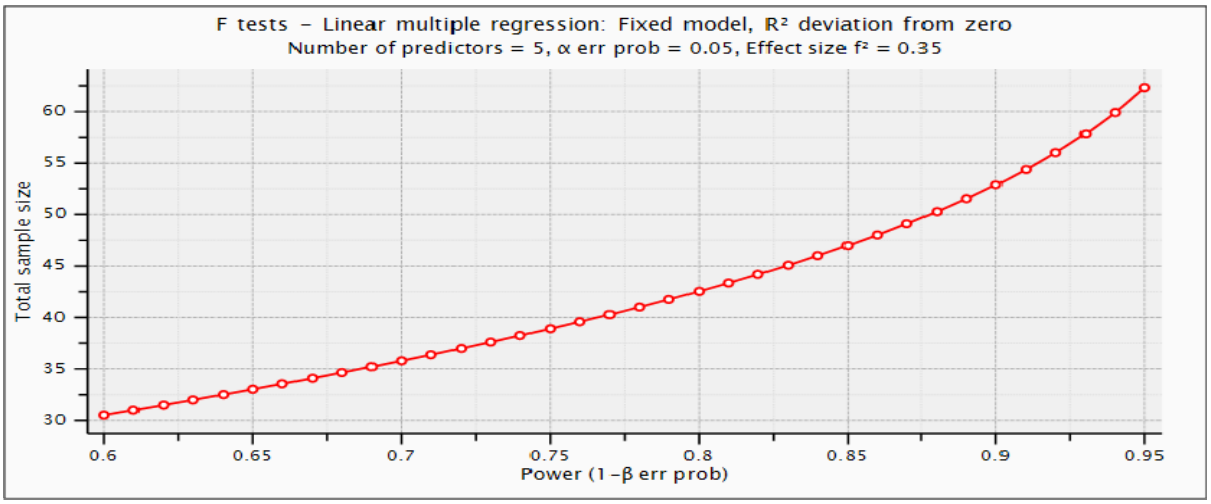

Figure 2. The range of values of the power plot with the total sample size

As shown in Figure 2 above, Power (1-b err prob) was set at 0.8 as suggested by Cohen (1988) and the minimum sampling set was at the sum of n = 43 comparable to the power reached 0.8. Therefore, our proposed sample size (n = 105) will be more than sufficient for the main objectives of this study and should also justify the expected contention (Erdfelder et al., 1996).

3. Results

3.1 Coefficient Analysis

In obtaining the data, the study used simple random sampling. This type of sampling is ideally used to identify phenomena occurring in a group of people (Groves et al., 2011). This method of exploring factors is made through double linear regression. The survey form is distributed through google forms, emails, and phone calls, from 2020 to January 2021. Before the analysis of the coefficients of each variable was made, this study confirmed the instruments of the study questionnaire with Alpha Cronbach's value as proposed by Tavakol and Dennick (2011). The resulting Alpha value is 0.886, which is more than the value of 0.60 as proposed by Nunally and Bernstein (1994), also more than 0.7 as proposed by Carmines and Zeller (1979). With the validity of the alpha, the study can be continued with the analysis of the coefficient of variables, as shown in Table 2 below

Table 2. Cronbach's Alpha

Reliability Statistics		
Alpha Cronbach	Alpha Cronbach Based on Standard Items	N Item
.886	.886	6

With a high alpha rate (α = 0.886), this means that there is a high reliability of the predictor effect on dependent variables (MLE performance), which indicates an adequate internal consistency. In Table 3, R^2 shows a high value of 0.577. According to Cohen (1992), the values of R2 .12 and below indicate low, between the values of 0.13 and 0.25 indicate moderate, 0.26 and above indicate a measure of high effect (Cohen, 1992). Thus, it can be proved that the six instrument codes have a significant impact on the regression model and correspond to the observed data on the overall entrepreneurial performance of MLE, with a significant value (R^2 = 0. 436). Thus, the results of the accuracy of the data show that the instrument built is reliable and can be extended to hypothetical test analysis, as shown in Table 3 below:

Table 3. R-Squared (R^2) coefficient

Model Summary				
Model	R	R Square	Coordinated R Square	Std. Estimated Error
1	.660[a]	.436	.407	.891

Note. a. Forecaster: (Constant), DSC5, DSC3, DSC1, DSC4, DSC2.

With a sufficient value of R^2, the analysis continues with the value of the ANOVA coefficient, as a whole, the constructed framework model is important with a value of 0.000, as below 0.05 as proposed by Cohen (1992). The results of this analysis show that the construction of the MLE element variable in this study significantly affected MLE performance, as shown in Table 4 below:

Table 4. ANOVA variance analysis

Model	Total Squares	df	Min Square	F	Sig.
Regression	60.168	5	12.034	15.159	.000[b]
Waste	77.794	98	.794		
Total	137.962	103			

Note. a. Dependent Variable: Performance; b. Forecaster: (Constant), DSC5, DSC3, DSC1, DSC4, DSC2.

In the analysis of the Coefficient variable carried out on each variable, the important value is at p = 0.05 as proposed by Cohen (1992). Of the coefficient analysis carried out on each variable, there are only two variables that significantly affect the performance of MLE entrepreneurs, namely DSC3 (online platform as an important strategic management) at sig value. = 0.008, and DSC5 (optimizing interaction with each unit of the market through a digital platform on sig = 0.02), as shown in Table 5 below:

Table 5. Coefficient[a]

Model	Unsupported B	Coefficient Std. Error	Standard Coefficient Beta	t	Sig.
1 (Constant)	1.141	.548		2.082	.040
DSC1	.105	.099	.107	1.052	.295
DSC2	-.142	.121	-.147	-1.179	.241
DSC3	.300	.111	.262	2.697	.008
DSC4	.147	.117	.147	1.256	.212
DSC5	.386	.124	.400	3.108	.002

Note. a. Dependent Variable: Performance.

3.2 Hypothetical Results

The study had six variables derived from the recommendations of previous studies (Ulezko et al., 2019). Analysis of the validity of the study instrument was carried out with an alpha value (α) of 0.886, sufficient for the analysis of the double linear regression to be performed. By acquiring a sufficient R-square consistency value i.e., at = 0.436, it shows that the five independent variables of this study have a strong influence on the dependent variables that perform. Meanwhile, through coefficient analysis, there are only two important predictors in influencing MLE performance, which is the most important start being; 1) Use of online platforms in strategic management and, 2) optimize interaction with each unit of the market through a digital platform, as shown in Table 6 below:

Table 6. Summary analysis

NO	CODE	SIG.	STATUS
1	DSC1	.295	Not significant
2	DSC2	.241	Not significant
3	DSC3	.008	Significant
4	DSC4	.212	Not significant
5	DSC5	.002	Significant
6	Performance	.040 (constant)	

Thus, from the findings of the study analysis, the researcher can draw conclusions based on three hypotheses, namely:

Ho1: Internet platforms have been used by MLEs to improve the effectiveness of their operations *and business performance-*

Ho1 is important at the value of ANOVA sig = 0.000, and with the value F = 15.159, which is higher than the critical F expressed at the value F = 2.46965. With a pprofitation value lower than 0.05 and a higher F value than a critical F, this could indicate that MLEs have

used internet platforms to significantly improve their operational capabilities and business performance.

Ho2: The willingness of MLEs to develop digital supply chain platforms in their business operations affects business performance. – does not matter

Ho2 does not matter because the value of DSC 4 exceeds 0.05 (p = 0.212). this shows that MLE's willingness to upgrade its digital-based infrastructure and management does not have a significant impact on their performance. The findings also suggest that MLE sees the cost and risk of digitalization as a challenge in improving digital capabilities and facilities.

Ho3: The use of the MLE digital supply chain affects the performance of their business. - It's important.

Ho3 is important with a high Alpha Cronbach value (α = 0.886), while the data consistency value is also at an adequate rate (R2 = 0.436), which is higher than necessary at a minimum rate of 0.26 or above indicating a high effect measurement. While the pANOVA value is on sig = 0.000.

4. Discussion and Conclusion

This study looked in general at the digitalization of the MLE supply chain and its impact on business performance. The five cores of digitalization are derived from past research sources and serve as an element of MLE's business performance forecast assessment. The sampling method is a simple random sampling. A total of 105 respondents responded online and google form platforms from 2020 to January 2021. The instrument of exploratory study of this factor is confirmed by the value of Alfa Cronbach, while the consistency of the data is accessed with the value of R-square. The results of the coefficient analysis show that the constructed framework has a significant impact through ANOVA analysis. The results of the study found that micro-farm entrepreneurs have started using internet platforms in their business operations. However, they do not yet have the willingness in terms of the costs and risks that may arise from the development of infrastructure and the management of their digitalization improvements. This study suggests further research is done with a more comprehensive triangulation methodology, as well as a broader subject of study, to see and assess the capabilities of entrepreneurs and the digitization of their businesses in more depth, as well as assist them in more effective supply chain strategies and development.

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