

Empowering Malaysian micro agri-entrepreneurs: the role of key success factors in e-agribusiness adoption

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ABSTRACT

Progress in the agricultural sector is one of the most imperative tools to enhance the productivity of agribusiness. This study identified the key success factors required for the adoption of e-agribusiness platforms in the Malaysian agriculture sector. The study analyzed potential key factors from the prior studies and contextually adjusted using a pilot study. These factors are categorized in various categories such as financial imperative, technological imperative, knowledge imperative, risk and trust factors, governance and public policy, and challenging business environment. The study has collected data from 302 micro agri-entrepreneurs within Malaysia through a questionnaire for quantitative analysis. The exploratory factor analysis (EFA) is used to see the impact of critical success factors (CSFs) that help to increase technological adoption thereby enhancing communication, advertisement, and overall sales of agri-products on the e-business platform. The study has a significant impact on key success factors (financial imperative, technological imperative, knowledge imperative, risk and trust factors, governance and public policy, and challenging business environment) on the adoption of e-agribusiness platforms. The findings provide guidelines to micro agri-entrepreneurs and policymakers that how to use key success factors to improve business performance by utilizing e-agribusiness platforms.

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1. INTRODUCTION

The food and agriculture sector has become a significant source of income, providing employment and generating substantial revenue from the export of goods globally. This sector is expanding due to population growth, shifting dietary preferences, and rising food demand. According to the Food and Agriculture Organization (FAO) [1], the global value added by forestry, agriculture, and fisheries increased by 73 percent from 2000 to 2019, reaching USD 3.5 trillion in 2018. Agriculture plays a critical role in the livelihoods of impoverished workers and the global economy, with 65 percent of poor working individuals relying on agriculture for their livelihoods in 2016. Additionally, the sector presents opportunities for shared prosperity and job creation. The \$5 trillion food and agribusiness sector accounts for 10% of global consumer spending. Small and medium-sized enterprises (SMEs) employ the majority of people worldwide, and this is particularly evident in the food industries of both developed and developing nations [2].

Along the entire agriculture value chain, substantial investment is required to foster inclusive agribusiness growth for everyone, from farmers to businesses. By connecting producers and business owners

to domestic, regional, and international markets either directly or through connections with other agribusinesses, it is possible to increase earnings, distribute food from surplus regions to deficit ones, and provide various sources of growth. Adopting e-business practices in agribusiness micro, small, and medium enterprises (MSMEs) enhance efficiency and competitiveness by leveraging internet-based business activities is called e-agribusiness [3]. This community enables individuals worldwide to share information, ideas, and resources, linking the global supply chain for crop inputs, from raw material producers to distributors and business partners. The e-agribusiness strategy addresses information and communication technology (ICT) gaps and challenges in the agricultural sector, generating new revenue streams, boosting employment opportunities across national networks, and ensuring the goals of the overall national farming strategy are achieved [4]. The advancement of information technology and the internet has significantly impacted how agribusiness is conducted and the composition of marketplaces. The integration of ICT in agriculture is increasingly common, transforming traditional practices and promoting sustainable development.

As far as the Malaysian agriculture sector is concerned, it is one of the most imperative sectors which creates income for the economy and is helpful to reduce poverty in Malaysia [5]. At the time of the financial crisis of 2007-2008, most of the Asian economies including Malaysia, the agriculture sector that served as the main source of income [6]. This sector is also facing various challenges such as lack of relevant knowledge, lack of ICT facilities, limited access to credit, sluggish market demand, insufficient knowledge of marketing places, constraints concerning government prudential, and inadequate facilities of utilities [7], [8]. According to FAO (2020) statistics, Malaysia's agriculture contributed 7.3% of the country's total GDP in 2018. This included USD 25469.2 in value-added for agriculture in 2018, as well as agricultural land use 8286.0 hectares and food exports were USD 19503. Additionally, 1570 individuals (thousand people) were employed in the agricultural sector, and the employment share of agriculture was 10.4% in 2019. As per the national small and medium enterprise (SME) development council of Malaysia, micro-enterprises are small organizations that are associated with the manufacturing and agro-based industries, with less than RM 300,000 annual sales turnover or have less than five full-time workers [9].

Due to globalization and technological advancement, e-agribusiness makes a substantial influence on the economic development of several countries as well as in Malaysia. The development of information technology (IT) and the internet make it, they are increasingly being used in agribusiness. In the developing countries such as Malaysia, the use of internet has become an important tool in life. The agribusiness is a huge cost reducer and a great platform to share risks and gains among agri-entrepreneurs. There are also many factors that enhance the productivity of agribusiness that's known as key success factors. Despite the growing importance of e-agribusiness in transforming the agricultural sector, limited research has focused on identifying the specific factors that drive successful adoption among micro agri-entrepreneurs in Malaysia. Prior studies have largely centered on SMEs, larger enterprises or generalized technological adoption, resulting in a considerable gap in understanding the specific challenges and success factors faced by micro agri-entrepreneurs in adopting e-agribusiness platforms.

The integration of e-business platforms has transformed various industries by improving operational efficiency, expanding market reach, and increasing profitability. However, the agricultural sector, particularly for micro agri-entrepreneurs, has been slow to adopt these platforms despite their significant potential to transform agribusinesses. Micro agri-entrepreneurs in Malaysia face distinct challenges that hinder the successful adoption of e-agribusiness platforms. These include limited access to financial resources, lack of technological knowledge, inadequate ICT infrastructure, and heightened perceptions of risk related to online transactions. Additionally, the absence of clear governance policies and public support further exacerbates the situation, leaving these entrepreneurs struggling to leverage e-platforms for business growth. Addressing these barriers is critical for ensuring the competitiveness and sustainability of micro agri-entrepreneurs in the digital age. Without effective solutions, these entrepreneurs risk falling behind, missing opportunities to enhance productivity, improve market access, and scale their businesses. This not only limits their economic prospects but also hinders the broader agricultural sector's contribution to Malaysian economy.

The aim of this paper is to identify the key success factors for the adoption of e-agribusiness platform in the Malaysian agriculture sector. These factors are categorized in various categories such as knowledge imperative, financial imperative, technological imperative, risk and trust factors, challenging business environment, and governance and public policy. Furthermore, the e-agribusiness platform plays a fundamental role, online business activities have many challenges and at the same time have advantages for micro agri-entrepreneurs. In Malaysia, the popular e-business websites include Lazada, Shopee, Mudah.my, Taobao, 11 Street, Harvey Norman, Signature Market, Hermo, and Carousell.

The availability of financial instruments has a considerable impact on the investment and production decisions made by smallholders. Agri-entrepreneurs face difficulty in producing their output due to less access to financial resources. Therefore, in the long run, credit is one of the empowering instruments that have the potential to improve agricultural output, promote food security, and transform farmers' lives from

one of utter destitution to one of greater dignity [10], [11]. Agribusiness development and economic stability are driven by technological availability, adoption of new technologies, and investment in research and development. The adoption of e-business also depends on knowledge imperative that includes IT knowledge, knowledge about e-agribusiness, online selling platforms, and different online websites [12], [13]. Moreover, risk and trust factors affect the decision of micro agri-entrepreneur in the adoption of technology and e-business. Higher expected returns are often one of the advantages of adopting risk, yet risk necessarily entails negative outcomes such as reduced yields and incomes and can potentially involve tragic incidents like financial distress, food insecurity, and human health issues. As a result, farmers handle a variety of risks that may have compounding impacts simultaneously [14], [15]. Although, strict regulations and government policies can either prevent or encourage smallholders from opting for e-agribusiness which may have substantial consequences on the overall sales and business activities [16]. Thus, key success factors are the various characteristics that are responsible for the attainment of end goals of any business or achievement in a particular market [17]. The identification and examination of the key success factors for micro-entrepreneurs particularly on the platform of e-agribusiness have also great importance for getting a competitive advantage [18]. Understanding these key success factors is vital for policymakers, e-business platform developers, and agri-entrepreneurs to improve business outcomes, increase market access, and enhance productivity in the agriculture sector. The findings of this study offer actionable insights that can directly inform policy initiatives and strategic decisions aimed at fostering the growth of micro agri-entrepreneurs in Malaysia and similar developing economies.

2. METHOD

A quantitative approach was utilized to identify the key success factors for the adoption of e-agribusiness platforms among micro agri-entrepreneurs in Malaysia. A cross-sectional survey design was employed to gather data from participants across various states. The quantitative method followed a deductive approach, as statistical hypothesis testing was used to derive general inferences about the population [19]. Data were collected through a structured questionnaire, administered via face-to-face interviews. The survey included multiple-choice and Likert-scale questions designed to assess participants' perceptions regarding key success factors.

For data analysis, the statistical package for the social sciences (SPSS) was used, with features for factor analysis, reliability analysis, and descriptive statistics. A total of 1,215 micro agri-entrepreneurs from various states in Malaysia were surveyed. Participants were selected using convenience sampling to ensure representation of diverse agricultural sectors. The inclusion criteria required that participants were actively engaged in agriculture and made use of some form of e-business. Data collection took place between January and July 2023. Interviews were conducted by trained research assistants, who explained the purpose of the study and obtained informed consent from each participant.

After the data collection process, responses were entered into SPSS for analysis. Data cleaning was performed to remove incomplete or inconsistent responses. From the 1,215 questionnaires distributed, 302 valid responses were included in the final analysis, yielding a response rate of 24.86%. Descriptive statistics were used to summarize the socio-demographic characteristics of the respondents, and exploratory factor analysis (EFA) was applied to identify the key success factors. The independent variables included financial imperative, technological imperative, knowledge imperative, risk and trust factors, governance and public policy, and challenging business environment-adapted from existing literature [20]-[25]. The dependent variable was the adoption of e-agribusiness platforms, which was measured using Likert-scale items indicating participants' levels of agreement or satisfaction. Demographic variables such as age, gender, and education level were controlled for throughout the analysis.

The EFA, a form of multivariate analysis, was used to describe the variance among observed variables. The analysis accounted for statistical significance among variables and explored unobserved factors by considering them as linear combinations of observed variables, with an additional error term. This helped to either categorize or reduce the number of variables. The socio-demographic data presented in Table 1, a diverse profile of micro agri-entrepreneurs, highlighting balanced gender participation (48.7% male, 51.3% female) and a youthful demographic, with 67.5% aged between 18 and 37. Participants represented various states, with the highest participation from Malacca (31.8%) and Selangor (21.5%). Educational backgrounds were also varied, with 35.8% having completed SPM, 27.5% holding STPM/diplomas, and 20.9% possessing bachelor's degrees. The majority (57.6%) had been involved in agri-entrepreneurship for 0-5 years, indicating recent interest in the field. This diverse sample strengthened the study's conclusions regarding the dynamics of e-agribusiness adoption among micro agri-entrepreneurs in Malaysia.

Table 1. Socio-demographic data

Variable	Item	F	%	
Gender	Male	147	48.7	
	Female	155	51.3	
Age	18–27	108	35.7	
	28–37	96	31.8	
	38–47	62	20.5	
	48–57	20	6.6	
	More than 58	16	5.2	
States	Federal territory of Kuala Lumpur	6	.0	
	Federal territory of Putrajaya	1	0.3	
	Johor			
	Kedah	26	8.6	
	Kelantan	13	4.3	
	Malacca	17	5.6	
	Negeri Sembilan	96	31.8	
	Pahang	17	5.6	
	Perak	14	4.6	
	Perlis	28	9.3	
	Penang	4	1.3	
	Sabah	7	2.3	
	Selangor	5	1.7	
	Terengganu	65	21.5	
		3	1.0	
	Level of education states	PMR	16	5.3
		SPM	108	35.8
Sijil Kemahiran		29	9.6	
STPM/Diploma		83	27.5	
Bachelor's degree		63	20.9	
Master (Postgraduate)		2	0.7	
Ph.D.		1	0.3	
Working as agri-entrepreneur (in years)	0–5	174	57.6	
	6–10	80	26.5	
	11–15	26	8.6	
	16–20	9	2.9	
	More than 21	13	4.3	

3. RESULTS AND DISCUSSION

The study has a pre-testing to check the validation of data and the pilot test based on 70 responds, to see the reliability. A pilot study is a preliminary investigation that helps in developing and modifying a larger sample size. Thus, pilot research can fix problems in the proposed experiment or process' design before resources are expended on larger-scale studies [26]. Consequently, using a pilot study is one of the best ways for a researcher to lower the risk of a failed actual study. Table 2 shows the results of Kaiser-Meyer-Olkin (KMO) and Bartlett's test, the value is 0.950 that shows the sampling is adequate. In general, the rule is a KMO value must be greater than 0.5 shows the sampling adequacy and to perform the test to determine whether factor analysis should be used on the given data set. Moreover, the significance level of Bartlett's test below 0.05, in this study the value is 0.00 that indicates the substantial correlation in the data. In addition, Table 3 shows the rotated component matrix, which reflects the strength of relationship between components and their items.

Table 2. KMO and Bartlett's test

KMO and Bartlett's test	Value
KMO measure of sampling adequacy	0.950
Bartlett's test of sphericity approx. chi-square	11160.040
Df	780
Significance	0.000

EFA is frequently used to identify the structure of a measure and assess its internal consistency. The items and components are loaded that is also called factor loading. Factor loadings were used to test the reliability of each item. Item reliability was clearly highlighted by [27] as the key criterion for evaluating a reflective measurement model. Factor loading shows the level at which respective constructs of the survey items can be measured by the items. Items whose factor loadings exceed 0.50 are regarded as reliable items, while any item whose value is less than 0.5 must be eliminated [27], [28]. In this study, 6 components are

extracted from the rotated component matrix. The first component is knowledge imperative (KI) and the items under KI have value more than 0.5 indicate the substantial influence on e-agribusiness. Knowledge is power so the ability to acquire knowledge makes people more efficient, preservation, and transmission to subsequent generations. The utilization of computers with Internet access is straightforwardly linked with the degree of knowledge of the operator, the income from off-farm activities, and the regional location of the farm [29]-[31]. The use of new technologies in e-business is popular with millennials (generation Y) who grew up with computers, who are interested in technology, and everyday use of technological tools is a given fact in their life. Millennials are 'tech-savvy, well informed about new technological innovations, rapid learners, and accept diversity [32]. There is only one item whose value is less than 0.5 so the study excluded it due to an unobserved item. Effective knowledge dissemination initiatives empower micro agri-entrepreneurs to maximize the platform's potential, enabling them to access broader markets and drive wider adoption across the agricultural sector [22], [23]. However, the study [33] argued that while the knowledge factor may not strongly influence performance expectancy in e-commerce, it still serves as a crucial determinant in the adoption of e-commerce among SMEs. This highlights the ongoing importance of knowledge in fostering e-business transformation.

The study reveals that the financial imperative (FI) is crucial for the success of e-agribusiness among micro agri-entrepreneurs. Financial inclusivity significantly enhances overall sales and business activities, as trading on e-agribusiness platforms creates backward linkages with producers, which can improve farm yields and increase income. Consequently, this factor greatly influences the adoption of e-agribusiness platforms [34], [35]. Furthermore, the intention of agri-entrepreneurs to utilize mobile banking is significantly shaped by factors such as social influence, perceived financial costs, expectations regarding performance, and perceived credibility [20]. This indicated that financial considerations and social dynamics play an essential role in the broader adoption of digital financial solutions. Additionally, the presence of asymmetric information regarding lending sources and financial market regulations creates a significant gap between the demand for and supply of credit. As a result, easier access to bank loans and e-banking can help micro agri-entrepreneurs navigate financial inclusion challenges. The availability of financial instruments plays a crucial role in shaping the investment and production decisions of farmers. If these financial tools do not align with their needs or if there is a lack of adequate risk mitigation strategies, farmers may hesitate to adopt new technologies, purchase agricultural inputs, or make decisions that could enhance their business efficiency. Improved access to finance can empower farmers by expanding their investment options and enhancing their capacity to manage risks [36]-[38].

The technological imperative (TI) identified in this study plays a significant role in enhancing agricultural productivity. Innovations and the adoption of new technologies, particularly within the telecommunications sector, facilitate communication between consumers and sellers. As a result, many micro agri-entrepreneurs who are well-versed in marketing techniques and maintain a robust social media presence tend to achieve higher sales compared to those who are less informed about e-agribusiness platforms. However, it has been noted that many organizations adopting e-business tools often lack the necessary knowledge about effective strategies for utilizing these new technologies, which can hinder the success of their initiatives. The mere adoption of technology is insufficient for transitioning into e-business; success requires relevant knowledge, strategic planning, and a coherent business strategy [39], [40]. Moreover, the adoption of the internet of things among farmers illustrates how perceived risks and trust can influence entrepreneurial decisions regarding technology and e-business. Research indicated a positive correlation between trust and perceived benefits, while an inverse relationship exists between perceived risk and trust [25]. Thus, risk and trust factors (R&T) significantly impact the adoption of e-agribusiness platforms. While higher expected returns can motivate risk-taking, such risks may also lead to negative consequences, including reduced yields, financial distress, food insecurity, and other critical issues. Consequently, farmers often manage multiple risks that can compound their challenges simultaneously [14], [15], [41].

The challenging business environment can positively influence e-agribusiness by driving micro agri-entrepreneurs to adapt and enhance their operational practices. Empirical findings highlight that key success factors (CSFs) significantly impact decision-making processes related to the adoption of e-agribusiness, ultimately leading to increased revenues. In such conditions, micro Agri-entrepreneurs are compelled to improve their services, focusing on product consistency and timely delivery while navigating obstacles like perishability of agricultural products, cybersecurity threats, and the need for adopting various technologies. These challenges encourage agri-entrepreneurs to refine their online operations, which can greatly enhance their performance and competitiveness in the market. Research indicated that addressing these hurdles effectively can lead to improved service quality and operational efficiency [25], [34], [35]. Thus, the ability to thrive in a challenging business environment is essential for the success of e-agribusinesses, as it fosters innovation and resilience among micro agri-entrepreneurs.

Table 3. Rotated component matrix

Component	Component					
	1	2	3	4	5	6
Knowledge about e-business	0.824					
Relevant courses/training	0.801					
IT knowledge	0.794					
Knowledge about marketing	0.753					
Knowledge about online platforms of the agribusiness	0.749					
Understanding of different apps. (WhatsApp, Lazada, Twitter, Muddah.my, and Facebook)	0.710					
Knowledge about selling websites	0.688					
Mobile App for online transactions	0.569					
Cost involves in doing e-business		0.772				
Value of Malaysian ringgit		0.772				
Taking a business loan from banks is very easy		0.757				
The volume of online transaction		0.754				
A bank loan for business		0.733				
E-banking		0.552				
Current rates (charges) of internet access are affordable			0.699			
Advertising product in online platforms is easy			0.696			
Selling product in an online platform is easy			0.675			
Device to access (Smartphone, Tablet, Laptop)			0.663			
Internet speed is good			0.631			
E-agribusiness helps to improve traceability in agribusiness			0.626			
Procedure of online selling websites			0.622			
Cost to engage with platform is cheaper			0.570			
Account acquisition risk				0.762		
Risk of credit card fraud				0.721		
Online price scrapping/fighting by competitors				0.705		
Risk of malware attacks				0.678		
I am risk-averse				0.614		
online transactions are risky				0.603		
I trust e-agribusiness platform				0.548		
Product consistency					0.736	
Technological challenges concerning cyber and data security					0.731	
E-agribusiness helps to improve the reputation of micro agri-entrepreneurs					0.685	
Competition is high in online trading					0.668	
The reputation of platform is important for e-agribusiness					0.635	
Perishability of agriculture products					0.583	
Change in govt. policies does not affect e-agribusiness trading						0.767
It is easy to understand govt. policies about e-agribusiness						0.759
Govt. provides sufficient Support for e-agribusiness trading						0.713
Govt. provides sufficient training for e-agribusiness trading						0.668
Extraction method: principal component analysis						
Rotation method: varimax with Kaiser normalization						
Rotation converged in 8 iterations						

Governance and public policy (GPP) have a notable impact on the adoption of e-agribusiness platforms, as evidenced by the significant role they play in facilitating key success factors. To support micro agri-entrepreneurs, governments should ensure sufficient backing through clear regulations, guidelines, and comprehensive training programs to enable effective e-agribusiness adoption. Strong governance and public policies foster an enabling environment by promoting fairness and transparency in the sector [16]. Moreover, government support programs can significantly enhance the impact of entrepreneurial orientation on business performance, creating further incentives for adopting e-agribusiness technologies [42]. By providing necessary resources, training, and policy frameworks, governments can empower entrepreneurs to leverage digital platforms effectively, thus driving industry growth and sustainability.

According to the Kaiser criterion, eigenvalue is a good criteria for determining a factor. If eigenvalue is greater than 1, we should consider that a factor. Table 4 shows the results of eigenvalue so all factors have significant value. The next results are in this table regarding total variance explained, factor 1 (KI) explained 17.517%, factor 2 (FI) explained 13.059, factor 3 (TI) explained 11.521, factor 4 (R and T) explained 10.616, factor 5 (CBE) explained 10.384 and factor 6 (GPP) explained 9.583 of the variations in the variables included so all the 6 components are able to explain of 72.679% variant of the data.

The items' internal consistency is utilized for calculating construct reliability [43]. The composite reliability score and Cronbach's alpha are the basic criteria for assessing internal consistency [27]. The same range meaning is applicable to constructs that have a high Cronbach's alpha value. A minimum of 0.7 is the standard value accepted for both CA and CR [44]. Table 5 shows the results of Cronbach's alpha and the value is 0.982 that indicates excellent internal consistency.

Table 4. Eigenvalues and total variance explained

	Component					
	1	2	3	4	5	6
Eigenvalue	18.597	3.999	2.001	1.821	1.468	1.186
% of variance	17.517	13.059	11.521	10.616	10.384	9.583
Cumulative %	17.517	30.575	42.096	52.712	63.096	72.679

Table 5. Reliability statistics

Cronbach' Alpha	Cronbach' Alpha based on standardized items	N of items
0.982	0.982	85
n=302		

4. CONCLUSION

This study provides a comprehensive analysis of the key success factors influencing the adoption of e-agribusiness platforms among micro agri-entrepreneurs in Malaysia. The findings highlighted that financial, technological, and knowledge imperatives are significant drivers of success, positively impacting overall sales and business activities. Additionally, the study emphasizes the importance of governance and public policy, risk and trust factors, and the challenging business environment as critical factors shaping e-agribusiness adoption. These insights address gaps in the literature, offering a focused perspective on how these platforms can be successfully implemented in the context of micro agri-entrepreneurs, a group that has been largely underrepresented in prior studies.

The financial and knowledge imperatives have a strong influence on e-agribusiness success. Agri-entrepreneurs with access to financial resources, e-commerce technology, and a broad social media network can more easily communicate and advertise their agricultural products, driving higher engagement on e-agribusiness platforms. However, access to credit remains a major challenge for many micro agri-entrepreneurs. These micro agri-entrepreneurs with a large social media network and access to e-commerce technology and knowledge can easily communicate or advertise their agri-products between consumers and suppliers on the e-platform. Public policy should be designed to address this issue, facilitating easier access to financing and providing the necessary support for these entrepreneurs to thrive in a digital environment. This research underscores the need for policies that promote financial inclusion and technical knowledge to support the adoption of e-agribusiness platforms by micro agri-entrepreneurs, ensuring they can reach a wider consumer base and enhance their business prospects.

Unlike previous research that primarily focused on SMEs and larger agricultural enterprises or generalized technology adoption frameworks, this study specifically targets micro agri-entrepreneurs. It offers a tailored approach to understanding the unique challenges faced by this group, filling an important gap in the literature. By analyzing the specific factors influencing micro agri-entrepreneurs' ability to adopt e-agribusiness platforms, this research provides a deeper, more nuanced understanding of the dynamics at play, contributing valuable insights to both the academic community and industry practitioners.

The broader significance of this study extends beyond its academic contributions. The findings have practical implications for policymakers, platform developers, and the micro agri-entrepreneurs themselves. By identifying the key success factors for e-agribusiness adoption, this research offers a strategic roadmap for enhancing productivity, increasing market access, and improving the sustainability of micro agri-entrepreneurs in Malaysia. Furthermore, the study suggested that government support through targeted training programs and policy interventions could significantly improve the adoption rates of e-agribusiness platforms. Future research can build upon these insights by exploring specific interventions, such as financial support programs and digital literacy initiatives, to further promote e-agribusiness adoption in other developing regions, thereby expanding the potential impact of these findings.

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