INVESTIGATING FACTORS IN THE TECHNOLOGY-ORGANIZATION-ENVIRONMENT (TOE) MODEL THAT PROMOTE SMALL AND MEDIUM-SIZED BUSINESSES (SMES) IN THE FOOD INDUSTRY TO ADOPT E-COMMERCE

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Abstract

E-commerce as a medium for online transactions by business actors can increase the productivity of small to medium-scale food businesses (SMEs). This work presents a research study on determinants adopted by small to medium-sized businesses (SMEs) of e-commerce food based on the technology-organization-environment model. The work adopts the framework by considering factors/attributes, perceived benefit, perceived compatibility, technology, firm size, culture, organization readiness, organization, customer pressure, competitor, external support, environment, and adoption by eCommerce in food small to medium-sized businesses (SMEs) as factors. The target of the work focuses on Bangkok areas especially Phra Khanong, On Nut, Bangchak, Punnawithi, and Udomsuk. The results of the data collection using Smart PLS together with technological indicators, perceived benefits and perceived compatibility show a significant effect on technology in terms of the adoption of e-commerce by small to medium-sized food businesses (SMEs). Organizational indicators, firm size and organization readiness have a significant effect on the organization in terms of the adoption of e-commerce by small to medium-sized food businesses (SMEs), but culture is not found significant. Moreover, environmental indicators, customer pressure, competitors and external support have a significant effect on the environment in terms of the adoption of e-commerce by small to medium-sized food businesses (SMEs).

Keywords: E-Commerce, Food Industry, Small and Medium-Sized Businesses (SMEs), Technology-Organization-Environment (TOE) Model

Introduction

Economics has changed many aspects of business, not only in terms of selling, dealing, or purchasing with suppliers and customers, but it has also changed the business from physical goods to information, intelligence, and service, from the perspective of representing the seller to the buyer and from production excellence to the customer (Achrol & Kotler, 1999; Rayport.et.al, 2001; Macgregor and Vrazalic, 2005). To survive in the modern economy, growth businesses including small to medium businesses are pushed to adopt e-commerce. With government attention, the adoption of e-commerce by small to medium-scale businesses (SMEs) in the food sector is far from being adopted by large corporations. Small to medium-scale businesses in the food sector of play an important role in economic development not only in terms of number but also in terms of employment. Small to medium businesses (SMEs) of food are recognized as a driving force for innovation, economic upturn in household income, welfare, and social change (Kotelnikov, 2007; Chong, 2008). The purpose of this study is to see if the technology-organization-environment (TOE) influences the adoption of e-commerce for small to medium-sized businesses (SMEs) in the food industry.

Objectives of the Study

The research objectives are described as follows;

1. To study whether the Technology-Organization-Environment (TOE) influences the implementation of e-commerce businesses in the food industry in small to medium-sized businesses (SMEs) in Bangkok, Thailand.

2. To investigate empirically and identify the factors that affect the adoption of e-commerce in small to medium-scale food businesses (SMEs) in Thailand.

Research Framework

The conceptualized framework links between Technology-Organization-Environment (TOE) and small to medium-scale food businesses (SMEs). Twelve variables used were perceived benefit, perceived compatibility, technology, firm size, culture, organization readiness, organization, customer pressure, competitor, external support, environment, and adoption of eCommerce by small to medium-sized food businesses (SMEs) as shown in Figure 1.
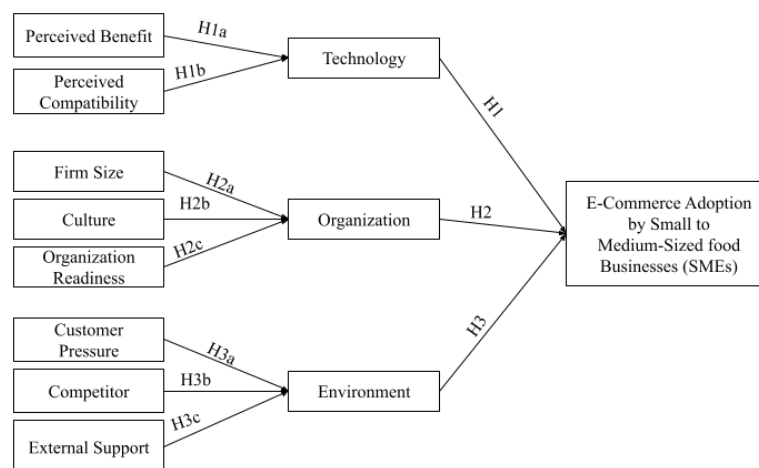
Figure 1 Conceptual Framework

Significance of the Study

At present, e-commerce is adopted by small to medium-sized food businesses (SMEs). However, as the adoption and adaption to understand the willingness or hesitance of people become empirical, the adoption of electronic commerce by small to medium-scale food businesses (SMEs) is an important source of economic upturn and very important for employment creation. The adoption of eCommerce, influencing TOE factors that affect and verify the relationship between adopting eCommerce and small to medium-sized food businesses (SMEs) in Bangkok, Thailand will be investigated.

Literature Review

1. Technology-Organization-Environment (TOE) Model

Technology describes available technologies and internal technology existing in the organization (Missra & Mondal, 2011) and focuses on the infrastructure and technology including technology how-know of employees, and a number of computers (Baker, 2012). The decision of the small to medium-sized food business sector of technology does not rely on the available market only but includes technology possession (Girish, 2014). This study on the technology factors used two characteristics (perceived benefits and perceived compatibility) of technology with two hypotheses:

H1a: Perceived Benefit has a significant effect on technology in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

H1b: Perceived Compatibility has a significant effect on technology in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

Organizations describe value, structure, and decision-making mechanisms for organizations in the organization rank as the most critical context in electronic commerce

implementation (Ade, Ninuk, and Rizky, 2022). This study of the organization factor used three characteristics (firm size, culture, and organization readiness) of the organization.

H2a: Firm Size has a significant effect on the organization in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

H2b: Culture has a significant effect on the organization in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

H2c: Organization Readiness has a significant effect on the organization in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

The environment describes available external organizations including competition, the structure of the industry, regulations and external suppliers, and government incentives (Baker, 2012). Governments have an impact on technology, influencing the adoption of small to medium-scale businesses in the food industry (Das & Das, 2012). However, the environment of an organization specific to small to medium-scale food businesses (SMEs) adoption includes trade partner pressure and competitive pressures in the small to medium-sized food businesses (SMEs) sector based on the Technology-Organization-Environment (TOE) framework (Girish, 2014). This study factor used three characteristics (customer pressure, competitor, and external support) of the environment.

H3a: Customer Pressure has a significant effect on the environment in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

H3b: Competitor has a significant effect on the environment in terms of the adoption of eCommerce by small and medium-scale food enterprises (SMEs).

H3c: External Support has a significant effect on the environment in terms of the adoption of eCommerce by small to medium-scale food businesses (SMEs).

2. Information about the Adoption of E-Commerce in Thailand

Trade opportunities enhance existing export activities, acquire new customers and develop successful online ordering processes. A transactional site has pages for placing orders or conducting an online financial transaction. Some sites request a login to complete the transaction (Palmer, 2002). The eCommerce results of small to medium-scale Greek food businesses (SMEs) can be easily concluded that most small to medium-sized Greek food businesses (SMEs) use their website as a place where the visitor can find their addresses, along with telephone numbers and short or detailed stories about the companies, while almost all websites have the companies' names and logos on every page (Aspasia Vlahveia, Ourania, and Evita Grigorioua, 2013).

3. Overview of Small to Medium-Sized Food Businesses (SMEs) in Thailand

In 2020, small to medium-sized food businesses as one-stop service centers (OSMEP, 2020) in Thailand reported the distribution of employment under small to medium-sized food businesses (SMEs) by region. Bangkok had the highest share of employment, accounting approximately for 34 percent of the total small to medium-sized food businesses employment

in the central region. Small to medium-sized food business enterprises (SMEs) employment was in the metropolitan areas including Samutsakhon, Nontaburi, Samut-Prakan, Pathumthani, and Nakhon-Pathom, accounting approximately for 18 percent, followed by the East, accounting approximately for 14 percent.

Research Methodology

This study applied a quantitative approach. The online questionnaire was created with the Google Form and distributed. The survey questionnaire consisted of screening questions, demographic information, and an assessment of the owner's or manager's experience. All variables in this study and the measurements include Average Variance Extracted (AVE), Composite Reliabilities (CR), and Discriminant Validity (DV) as deployed in the hypotheses, questionnaire, and instrument used.

1. Population and Sample Size

The sample groups used in this research were managers of small to medium-scale food businesses and owners of small to medium-scale food businesses in Bangkok, of which the exact number is unknown. Therefore, the appropriate sample size was determined in this research using William Gemmell Cochran s (1993) model. William Gemmell Cochran indicates a 95% probability for obtaining a sample of 385 cases (Atchara Meksuwan, 2017). The Structural equation models propose 241 samples. Furthermore, it was suggested that the sample size should be 400. For this reason, to prevent data errors, a total of 400 samples were collected in Bangkok areas especially Phra Khanong, On Nut, Bangchak, Punnawithi, and Udomsuk.

2. Sampling Technique

A non-probability sampling technique was used by means of quota and convenience sampling. Quota sampling is used to ensure the different subsets in a population. Convenience sampling is best suited for a large number of questionnaires that can be completed easily and quickly. Considering limited budget and time constraints, these methods were chosen for this study (Malhotra & Zikmund, 1999; Cooper and Schindler, 2001; Yu, et.al 2016).

Table 1 Sample Size for Sampling

Target	Population Size = 1498	Sample Size = 400
Café	117	32
Restaurant	718	191
Fast Food	520	139
Ice Cream and Bakery	143	38

Source: Created by Author

Results and Discussion

      1. Demographic Information

      The analysis of the demographic information indicated that the majority of samples were males with the age range between 30-39 years. They were mainly business owners with the education level of a Bachelor's degree and the type of small to medium-scale food businesses (SMEs) was restaurants. They had monthly income of more than 45,001 THB, and had business experience between 5-10 years.

Table 2 Demographic Analysis Results

Variable	Type	Frequency	Valid Percentage (%)
Gender	Male	213	53.3%
	Female	187	46.7%
Age	20-29 years	93	23.2%
	30-39 years	161	40.3%
	40-49 years	93	23.2%
	50-59 years	53	13.3%
Job	Business Owners	279	69.8%
	Managers	121	30.2%
Education Level	Below Bachelor's Degree	40	10%
	Bachelor's Degree	266	66.5%
	Master's Degree	94	23.5%
Type of small to medium-scale food businesses (SMEs)	Cafe	32	8%
	Restaurants	191	48%
	Fast Food	139	35%
	Ice Cream and Bakery	38	9%
Monthly Income	15,001-25,000 THB	26	6.5%
	25,001-35,000 THB	67	16.8%
	35,001-45,000 THB	121	30.2%
	Above 45,001 THB	186	46.5%
Experience	1-3 years	85	21.2%
	4-5 years	65	16.3%
	5-10 years	130	32.5%
	More than 10 years	120	30%

Source: Created by Author

2. Convergent Validity of the Measurement

Based on Table 3, the results of analysis using SmartPLS in which the loading factor value for items was greater than 0.6 indicate that the outer model between structures and variables satisfied convergent validity.

Table 3 Structures, Items, and Confirmatory Factor Analysis

	Item	Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Perceived	PB1	0.761	0.736	0.883	0.791
Benefit	PB2	0.765			
Perceived	PC1	0.774	0.859	0.914	0.780
Compatibility	PC2	0.819			
	PC3	0.865			
Technology	T	1.000	1.000	1.000	1.000
Firm Size	FS1	0.739	0.718	0.876	0.780
	FS2	0.759			
Culture	CU1	0.774	0.719	0.877	0.781
	CU2	0.726			
Organization Readiness	OR1	1.000	1.000	1.000	1.000
Organization	O	1.000	1.000	1.000	1.000
Customer Pressure	CP1	1.000	1.000	1.000	1.000
Competitor	C1	0.830	0.828	0.921	0.853
	C2	0.851			
External Support	ES1	1.000	1.000	1.000	1.000
Environment	E	1.000	1.000	1.000	1.000
eCommerce Adoption	Adopt1	0.868	0.930	0.947	0.783
	Adopt2	0.861			
	Adopt3	0.750			
	Adopt4	0.844			
	Adopt5	0.937			

Source: Created by Author

3. Model Structure Analysis

In Table 4, the technology variable was at 0.767 (R-Square) which means that indicators of perceived benefit and perceived compatibility could influence the technology variable by 76.7%. For the organization variable, it was at 0.943 which means that indicators of firm size, culture and organization readiness could influence the organization variable by 94.3%. For the environment variable, it was at 0.651 which means that indicators of customer pressure, competitor and external support could influence the environment variable by 65.1%. For the eCommerce adoption variable, it was at 0.887 which means that technology, organization, and environment variables could influence eCommerce adoption by 88.7%.

Table 4 R-Square Value

	R-Square	R-Square Adjusted
Technology	0.767	0.766
Organization	0.943	0.943
Environment	0.651	0.648
E-Commerce Adoption	0.887	0.886

Source: Created by Author

4. Path Analysis Results

Table 5 presents the path analysis results, p value of 0.000 ≤ 0.05 and T value > t-table 1.96.

Table 5 Path Analysis Results

	T-Test	P-Value	Result
Technology → eCommerce Adoption	7.247	0.000	Supported
Organization → eCommerece Adoption	5.147	0.000	Supported
Environment → eCommerce Adoption	3.550	0.000	Supported

Source: Created by Author

5. Results of Hypotheses Testing

Table 6 presents the results of hypotheses testing. The results were that H1a, H1b, H2a, H2c, H3a, H3b, H3c were supported, but H2b was not supported.

Table 6 Results of Hypotheses Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Results
H1a: P e r c e i v e d Benefit (PB) → Technology	0.347	0.343	0.066	5.292	0.000	Supported
H1b: P e r c e i v e d Compatibility (PC) → Technology	0.542	0.549	0.065	8.374	0.000	Supported
H1: Technology → eCommerce Adopt	0.571	0.580	0.073	7.875	0.000	Supported
H2a: Firm Size (FS) Organization	0.400	0.400	0.066	6.019	0.000	Supported
H2b: Culture (CU) Organization	0.006	0.007	0.024	0.247	0.805	Not Supported
H2c: Organization Readiness (OR) → Organization	0.592	0.591	0.064	9.260	0.000	Supported
H2: Organization e C o m m e r e c e Adopt	0.415	0.407	0.073	5.664	0.000	Supported
H3a: C u s t o m e r Pressure (CP) → Environment	0.611	0.609	0.033	18.674	0.000	Supported
H3b: Competitor (C) Environment	0.257	0.259	0.038	6.827	0.000	Supported
H3c: E x t e r n a l Support (ES) → Environment	-0.113	-0.113	0.034	3.309	0.001	Supported
H3: Environment → eCommerce Adopt	0.066	0.064	0.019	3.491	0.001	Supported

Source: Created by Author

It can be summarized as follows:

H1a: The correlation between perceived benefit and technology was positive and technologically significant, with the P-value of 0.000 and the t- value of 5.292.

H1b: The correlation between perceived compatibility and technology was positive and technologically significant, with the P value of 0.000 and the T value of 8.374.

H1: The correlation between technology and eCommerce adoption was positive and eCommerce adoptively significant, with the P value of 0.000 and the T value of 7.875.

H2a: The correlation between firm size and organization was positive and organizationally significant, with the P value of 0.000 and the T value of 6.019.

H2b: The correlation between culture and organization was negative and organizationally insignificant, with the P value of 0.805 and the T value of 0.247.

H2c: The correlation between organization readiness and organization was positive and organizationally significant, with the P value of 0.000 and the T value of 9.260.H2: The correlation between organization and eCommerce adoption was positive and eCommerce adoptively significant, with the P value of 0.000 and the T value of 5.664.

H3a: The correlation between customer pressure and the environment were positive and environmentally significant, with the P value of 0.000 and the T value of 18.674.

H3b: The correlation between competitor and the environment was positive and environmentally significant, with the P value of 0.001 and the T value of 6.827.

H3c: The correlation between external support and the environment was positive and environmentally significant, with the P value of 0.001 and the T value of 3.309.

H3: The correlation between environment and eCommerce adoption was positive and eCommerce adoptively significant, with the P value of 0.001 and the T value of 3.491.

Conclusions, Recommendations and Limitations

1. Conclusions

The finding shows that perceived benefit has a significant effect on technology in terms of the adoption of electronic commerce by small to medium-scale food businesses (SMEs). The finding is line with previous research studies by Qirim 2007; Chong, 2008; Maria and Tiago, 2010; Shah Alam, 2011; Rita Rahayu and John Day, 2015; Hassan N. Rawash, 2021. Perceived benefit can be applied to the degree of acceptance of the potential advantages that electronic commerce technology provides to organizations. Perceived compatibility can be applied to adequate eCommerce adoption with the existing technology structure and the market of the organization. In the organization, ideas are easily implemented provided they are compatible with the existing principles of the organization and are able to gratify the needs of the organization. It is also found that perceived benefit and perceived compatibility have a significant effect on technology in terms of eCommerce adoption as the correlation with eCommerce adoption was positive.

A firm size reflects that the organization tends to adopt more innovations in information technology in terms of risk and flexibility. The firm size has a significant and substantial effect on organizations in terms of eCommerce adoption. In fact, the firm size is

one determinant factor of eCommerce adoption and its correlation with eCommerce adoption was positive. Culture as investigated has no significant and substantial effect on organizations in terms of eCommerce adoption and culture is not one determinant factor of eCommerce adoption. The correlation of between culture and eCommerce adoption was negative and not statistically insignificant. Organization readiness for innovation and availability includes technical readiness, information technology, and human resources (Gui, and Fernando, 2020; Salma, 2020; Hassan N. Rawash, 2021; Lila Setiyani, and Yeny Rostiani, 2021).

Customers have the power to maintain the competitive position of small to medium-scale businesses to adopt e-commerce. Customer pressure is found to have a significant and substantial effect on the environment in terms of eCommerce adoption and customer pressure is one determinant factor of eCommerce adoption. Small to medium-scale food businesses have limited resources, so the government should maintain the rules and policies within this business transaction. The correlation between customer pressure and eCommerce adoption was positive (Zhu & Kraemer, 2005; Panji, et.al 2014; Rita Rahayu, and John Day, 2015).

Recommendations

This work is a research study on determinants adopted by small to medium-sized e-commerce food businesses (SMEs) based on the technology-organization-environment model. The analysis shows that technology indicators, perceived benefit and perceived compatibility, have a significant effect on technology in terms of eCommerce adoption. For organization indicators, firm size, and organization readiness have a significant and substantial effect on organizations in terms of eCommerce adoption, but culture has no significant effect on organizations in terms of eCommerce adoption. As for the environment indicators, customer pressure, competitor, and external support have a significant effect on the environment in terms of eCommerce adoption.

1. Limitations and Future Research

This research only looks into the relationships based on the Technology-Organization-Environment (TOE) model to adopt eCommerce for small to medium-sized food businesses (SMEs) especially in Bangkok, Thailand. It was not designed to befit other industries, and thus the conceptual framework can be modified. For future researchers, they would be able to develop further using the technology acceptance model, the unified theory of acceptance, the use of technology, and the theory of planned behavior to better understand the adoption of eCommerce in small to medium-scale food businesses.

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