THE ANTECEDENTS ON THE ADOPTION OF ADVANCED COSTING SYSTEMS IN THAILAND STARTUPS

Piyada Daowadueng*

Abstract

This study investigates the factors that influence the adoption of advanced costing systems in startup companies in Thailand. Contingency theory was used as the lens to explore the relationships. An online survey was sent to 232 startup companies in Thailand between January and March 2021 with 203 respondents completing the survey, providing a response rate of 87.5%. Logistic regression was used to determine the relationships between the contingency factors and the adoption of advanced costing systems. Based on the results of the logistic regression analysis, the likelihood of the adoption of advanced costing systems in startup companies in Thailand depends on firm age, level of product or service diversity, type of strategy, and the level of perceived environmental uncertainty. The results indicate that the decision to adopt advanced costing systems in startup companies in Thailand is related to a firm's specific circumstances. A good fit between the firm's unique circumstances and the type of management accounting techniques can improve the decision-making of startups and therefore the firms' survival over the long run.

Keywords: Adoption, Advanced Costing systems, Startup Company, Thailand

1. INTRODUCTION

A startup is a company or project initiated by an entrepreneur to seek, develop, and validate a scalable business model (Robehmed, 2013). Startup companies use technology and innovation to successfully drive their business (Maair and Fangjai, 2018). As startup companies are related to technology and innovation, they should take account of unexpected opportunities, new relationships, uncertain outputs, risk, and the possibility of failure.

In 2016, the Thai government began promoting the Thailand 4.0 policy, with the aim of making Thailand a high-income country and allowing the country to escape the middle trap (National Innovation Agency, 2021: 26). This policy looked at ways to drive the economy towards higher levels of innovation by increasing the level of support for creating new startups. As a result, there has been an increase in the number of startups companies in Thailand; startups have become the new economic warrior. The Thai government has taken the position that startups can facilitate regional growth, raise the level of added value in products and services, improve local employment, increase revenue, and support the process of creating new digital industries. Unfortunately, many Thai startups have found it difficult to survive in the long term. Prior literature reveals that this is because they lack manpower readiness, sources of funding, growth and scalability, good business plans, and good support from the government and partners, (National Innovation Agency, 2021; Maair and Fangjai 2018; Doungsong and Rodpon, 2022). Therefore, it would seem that Thai startups

* Dr. Piyada Daowadueng is currently working as a lecturer in the Department of Accountancy, Faculty of Business Administration and Accountancy, Khon Kaen Business School, Khon Kaen University, Thailand. She obtained a Ph.D. in Applied Economics from the University of Antwerp, Belgium. Email: piyadao@kku.ac.th

require significant help in improving their resilience.

Advanced costing systems are designed to eliminate variation and deliver pre-determined objectives as efficiently as possible. It is here argued that advanced costing systems may help a startup company to run its business successfully, as more detailed cost information from advanced costing systems can provide more detailed financial information to simulate planning, control, governance, and to facilitate decision making, maximizing the efficiency of the business (Sangboon and Swatdikun, 2018). If a startup company selects suitable management accounting techniques such as advanced costing systems, it can help the owner(s) to make the right decisions, reducing the likelihood of failure. Unfortunately, there is little understanding regarding the capability of Thai start-ups in successfully adopting advanced costing systems. As research studies focusing on this are limited, this study aims to investigate what variables are associated with the adoption of advanced costing systems in startup companies in Thailand.

This study employed a survey-based research design. The online survey was sent to 232 startup companies in Thailand from January through March 2021, with 203 surveys being returned, yielding an 87.5% response rate. The hypothesis was developed from the contingency perspective. Logistic regression was adopted to evaluate the relationship between the specified contingency factors and the adoption of advanced costing systems. Results of the logistic regression show that the probability of adoption of advanced costing systems in startup companies in Thailand depends on firm age, product or service diversity, strategy type, and perceived environmental uncertainty. This implies that the firm's circumstances influence the decision to adopt advanced costing systems in startup companies in Thailand. Thai startup owners may find these factors of interest when they begin the process of adopting advanced costing systems.

This study contributes to the research on management accounting in two ways. Firstly, it broadens the scope of research in management accounting techniques of startup companies, as there is currently limited research in this area. The research will identify and demonstrate the factors influencing the design of advanced costing systems in startup companies in Thailand, as well as providing evidence to confirm that the design of management accounting systems and techniques depends on a firm's characteristics or contextual factors (Chenhall, 2007). The study aims to provide evidence which demonstrates the relationship between the identified contingency variables and the adoption of advanced costing systems. Secondly, the study will consider the practical implications for startup owners, by looking into the circumstances which they may wish to consider before adopting any new management accounting techniques. Prior literature reveals that not all contingent factors will influence the likelihood of adopting advanced costing systems. Some advanced costing systems might not fit Thai startup companies. To avoid making a mistake, a startup's owner must ensure that the design of an advanced costing system fits with the firm's circumstances in the process of selecting suitable management accounting techniques that may help to increase the firm's performance and improve firm survival in the long run.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Advanced Costing Systems

Advanced costing is a system that focuses on established companies and stable settings. It guides an organization toward meeting its pre-defined objectives. The idea of advanced costing systems is that they are tools to implement goals arising from the strategic planning process (Ansoff, 1977; Anthony, 1965). Well-designed advanced costing systems keep deviations to a minimum and, in the case of unexpected

events, quickly bring the organization back to its pre-defined path. In this study, advanced costing systems comprise activity-based costing, activity-based management, target costing, and product life cycle costing.

Activity-based costing (ABC) is a system that was promoted as a method for reducing inaccuracies in the traditional costing system measurements that arise from product diversity and intensive global competition (Cooper & Kaplan, 1988); (Drury & Tayles, 2005). Proponents argue that more complex cost allocation systems, like ABC provide greater detail and are better able to classify costs according to behavior; they therefore provide more accurate cost data (Maiga et al., 2014; and Pizzini, 2006). A number of academic authors argue that cost allocation systems like ABC generate "better" (i.e., more relevant and useful) information that enhances managerial decision-making and enables improved performance (e.g., Maiga et al., 2014; Cagwin and Bouwman, 2002; Ittner et al., 2002; and Krumwiede, 1998).

Activity based management (ABM) is used to describe the cost management application of ABC (Drury, 2018). It views the business as a set of linked activities that ultimately add value to the customer. The goal of ABM is to enable customer needs to be satisfied while making fewer demands on organizational resources (i.e., cost reduction) (Drury, 2018: 598).

Target costing is a production control system. It was initially developed by the Japanese to manage new product development target costs and to help satisfy customer demands in an uncertain environment (Huang et al., 2012: 322). To set a target price, a company must first set target costs and target profits. This involves the coordination and integration of internal departments with external suppliers during product design and quality planning. Most innovation-based companies implement this costing system for setting their product price (Huang et al., 2012).

Product life cycle costing is a mathematical method used to form or support decisions and is usually employed when deliberating on a selection of options (Wee et al., 2011). The main objective of a life cycle costing analysis is to quantify the total cost of ownership of a product throughout its full life cycle, which includes research and development, production, operation, and disposal (Bull, 2003). Managers normally employ this method for project evaluation as it assists them in identifying areas in which cost reduction efforts are likely to be most effective (Drury, 2018). Therefore, it can determine the lowest cost (or the largest profit) parts along with the life cycle of the product.

2.2 Contingency Theory and the Adoption of Advanced Costing Systems in Startup Companies

The contingency theory approach to management accounting practices design is based on the premise that there is no universally appropriate management accounting practice that can apply equally to all organizations in all circumstances (Galbraith, 1973; Emmanuel et al., 1990; Haldma and Laats, 2002; Gerdin and Greve, 2008). Rather, it is suggested that particular features of management accounting practices will depend upon the specific circumstances in which the organization finds itself. The effectiveness of the design of a management accounting practice depends on its ability to adapt to changes in internal circumstances (e.g., firm age, firm size, product or service diversity, and strategy type) and external circumstances of organization (e.g., perceived environmental uncertainty, competitors, and industry type) (Davila and Foster, 2007; Drazin and Van de Ven, 1985; Anderson, 1995; Anderson and Young, 1999; Gosselin, 1997, Haldma and Laats, 2002).

Based on the literature review, four contingent factors were chosen for investigating the adoption of advanced costing systems in startup companies in Thailand.

Firm Age

Firm age has been associated with the

implementation of management accounting practices (Schoute, 2009; Schoute, 2011). Growth companies often adopt management accounting practices to overcome the limitations of informal management styles in making decisions (Davila and Foster, 2007). Literature reveals that older firms have greater accumulated experience allowing for the use of informal and contemporary management accounting practices (Bedford, 2015). The following hypothesis is proposed accordingly:

H1: Firm age is positively associated with the adoption of advanced costing systems.

Product or Service Diversity

Product or service diversity is argued to be the major factor causing the need to re-examine cost allocation procedures (Cooper and Kaplan, 1988: Gosselin, 1997; Cagwin and Bouwman, 2002). Product diversity can be present in several ways, including different product volumes for different products, different inputs, or differences in customization and complexity of the products (Cooper 1988; Dearman and Shields, 2001; Abernethy et al., 2001). Product diversity places higher and diverse demands on a firm's activities, and those activities place different demands on a firm's resources; it is considered to be one of the most important causes of distorted product costs within a conventional costing system (Schoute, 2011). Firms with high product or service diversity are assumed to adopt the most advanced costing systems. Therefore, the following hypothesis is proposed accordingly:

H2: A greater level of product or service diversity is positively associated with the adoption of advanced costing systems.

Strategy

With increasing global competition, business organisations have intensified the search for strategies that provide a sustainable competitive advantage (Popadiuk and Choo, 2006). Based on contingency theory thinking, organizations receive a competitive advantage when they are better able to match their strategy with the management accounting system they have implemented (Al-Omiri and Drury, 2007; Bouwens and Abernethy, 2000).

According to Porter's framework (1980, 1985), product cost strategy can be classified into two basic types, the low-cost strategy and product differentiation. Companies facing intensive competition have a greater impetus to more actively pursue their chosen low-cost strategy (Guilding and McManus, 2002). On the other hand, differentiators place greater emphasis on seeking ways to differentiate their products and services from those provided by their competitors. This frequently results in a greater number of product and service lines being offered and increased customer segmentation (Drury and Tayles, 2005; Kaplan and Norton, 2005).

Companies that intensively pursue a low-cost strategy while facing greater competition are likely to face lower margins. Under such circumstances managers require accurate cost information as they must control the cost of the product in order to set the selling price at a level which provides a suitable profit margin. In these circumstances there is a strong need for accurate cost information, while research suggests that accurate cost information can be gained from costing systems with a higher level of detail (Brierley, 2008; Drury and Tales, 2005; Innes et al, 2000).

In contrast, companies adopting a product differentiation strategy may not benefit from increased product-cost accuracy or more detailed information of the costs (Callahan and Gariel, 1998). Instead, their managers require higher frequency of product reporting, than cost data reporting (Guilding and McManus, 2002). Thus, the following hypothesis is assumed:

H3: Strategy is positively associated with the adoption of advanced costing systems.

Perceived Environmental Uncertainty

Management accounting research (e.g., Hartmann and Maas, 2011; Bouwens and Abernethy, 2000; Chong, 1996; Mia and Chenhall, 1994; Chenhall and Morris, 1986; and Gordon and Narayanan, 1984) suggest

that when environmental uncertainty increases, decision-makers seek more information for planning and control. A larger supply of information helps managers to improve the accuracy of their decisions (Chong, 1996; Chong and Chong, 1997; Chenhall and Morris, 1986). This correlates with Galbraith (1973) who revealed that under high environmental uncertainty, a greater amount of information is required to support decision-making.

If there is a mismatch between the information requirements of managers and the number of information cues, this may result in managers suffering either from information overload or information underload (Chong and Eggleton, 2003). When managers are confronted with low uncertainty situations, they can interpret the uncertainty relatively easily and make a decision based on a narrow range of information (Chong and Eggleton, 2003; Chong, 1996). If more detailed information is provided in low uncertainly situations, it may lead to information overload, which can have a dysfunctional impact on managerial decision-making (Chong and Eggleton, 2003; Chong, 1996; Chong and Chong, 1997). In contrast, when managers are confronted with high uncertainty situations, more information must be supplied. Managers operating in such situations may not have all the information necessary to perform the task, so they may need to obtain and process additional information to understand the task more clearly in order to enhance decision-making effectiveness (Chong, 1996: 417). If only a narrow range of information is available in an environment of high uncertainty, it may lead to information underload which can negatively affect the quality of decision-making.

Under conditions of high environmental uncertainty, such as an increase of competition, globalization, or product diversity, using advanced cost systems can enhance decision making through the provision of more detailed cost information (Maiga et al., 2014, Drury, 2018; Al-Omiri and Drury, 2007). Therefore, it is assumed that in an environment of high uncertainty, managers require the more detailed information provided by an advanced costing system. The following hypothesis is proposed accordingly:

H4: Perceived environmental uncertainty is positively associated with the adoption of advanced costing systems.

Based on the hypothesis development, the conceptual framework is prosed as shown in Figure 1.

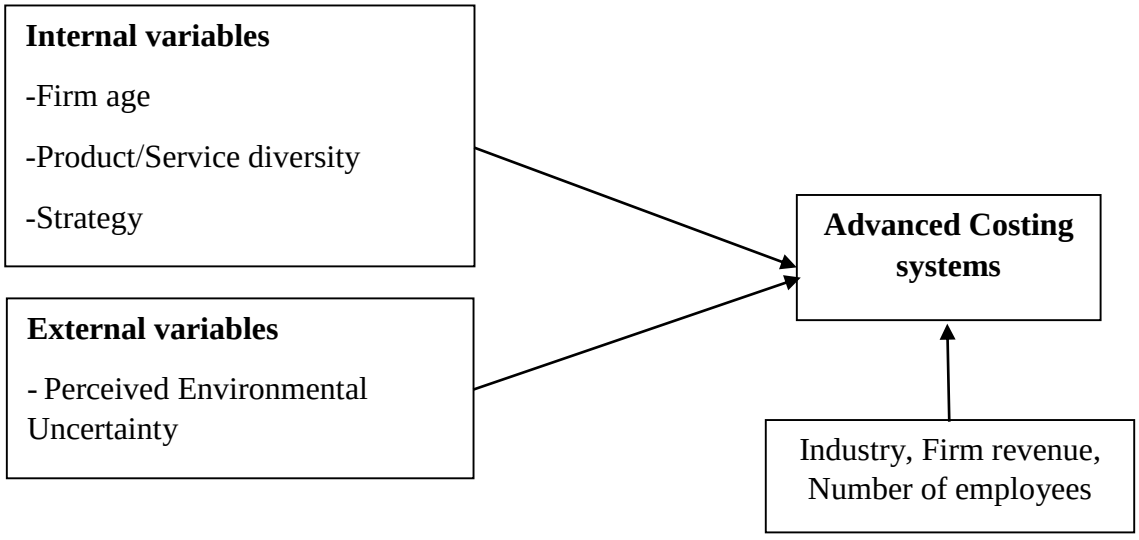

Figure 1 Conceptual Framework

3. METHODOLOGY

3.1 Research Population

The population of this research was drawn from startup companies in Thailand. According to the database of startup companies shown on the website Startup Thailand, a range of technology-based startup companies were included in the survey; these including Business and ServiceTech, IndustryTech, TravelTech, GovTech and EdTech, FinTech, HealthTech, Lifestyle and EntertainmentTech, PropertyTech, and AgriTech.

3.2 Data Collection

Data were collected via an online questionnaire using measurement constructs based on prior research studies. The questionnaire was pre-tested before sending to the respondents. As the number of relevant startup companies in Thailand is 232[1], the online survey was sent out to the owner of each startup company between January and March 2021. After two weeks, the survey was followed up by reminder calls.

A total of 203 completed surveys were returned and deemed usable for analysis, yielding a response rate of 87.5%. Regarding non-response bias, a T-test showed that there was non-response bias between the first and second wave responses ($P > 0.05$).

3.3 Variable Measurement

Firm Age. This variable refers to the age of the company since its establishment. It is measured by number of years.

Product or Service diversity. This variable refers to the conditions in which products or services put different demands on an organization's activities, and in turn its resources. Product or service diversity is measured as the number of different products and services present in the firm (Kallunki and Silvola, 2008). A dummy variable was set to equal 1 if a firm adopted more than one type of product or service, and 0 if a firm adopted only one type of product or service.

Strategy. This is a pattern of decisions regarding the organization's future (Mintzberg, 1978) that takes on meaning when it is implemented through the organization's structure and processes (Miles and Snow, 1978). This study adopts the concept of strategy from Porter's competitive strategy, which classifies strategy into two main dimensions, namely the low-cost strategy and differentiation strategy. With a low-cost strategy, organizations aim to become the lowest-cost producer in their industry. The source of this competitive advantage may arise from factors such as economies of scale, access to favorable raw material prices, or superior technology (Langfield-Smith, 1997: Govindarajan, 1988). With a differentiation strategy, an organization seeks to be unique in its industry in ways that are widely valued by buyers. Such organizations will be concerned with the quality of their product, after-sales service, wide availability of the product, and product flexibility (Langfield-Smith, 1997: Govindarajan, 1988). The measurement of strategy is derived from Govindarajan (1988). Respondents were asked to position their products or services in six areas, relative to leading competitors, using a 7-point Likert scale, ranging from "1 = significantly lower" to "7 = significantly higher". High values on this question indicated a differentiation strategy, while low values indicated a low-cost strategy. The measurement instrument was validated with the use of a principal component analysis with Varimax[2] rotation (Hair et al., 2010). As Hair et al. (2010) demonstrate, factor loadings of 0.50 and above are considered significant, 0.50 is used as the cutoff point for significant factor loading. Table 1 presents the descriptive statistics of each item and the associated factor loadings. As shown in Table 1, all factor loadings were above 0.50 with an

[1] The database was collected from the website of Startup Thailand.

[2]The Varimax method is one of the orthogonal rotation methods and it is more widely used for the factor rotation (Hair et al., 2010).

eigenvalue of 4.115 (greater than the 1.00 threshold). Furthermore, factor loading of the individual items is above 0.7, with a Cronbach's Alpha of 0.9. These results show that all indicators have internal consistency and reliability.

Perceived Environmental Uncertainty (PEU) is a situation that is unpredictable and difficult to anticipate (Chenhall, 2007; Hartmann and Maas, 2011). The measurement for PEU in this study was adopted from Govindarajan (1984) and Schoute (2009). Perceived environmental uncertainty is measured by eight items. Respondents were asked to indicate the firm's operating environment using a 7-point Likert scale ranging from "1 = very unpredictable" to "7 = very predictable". The measurement instrument was validated using a principal component analysis with Varimax rotation (Hair et al., 2010). As shown in Table 1, all factor loadings were above 0.50 with an eigenvalue of 4.663 (greater than the 1.00 threshold). Moreover, factor loading of the individual items was between 0.6-0.8 and the Cronbach's Alpha was 0.86, indicating that all indicators have adequate internal consistency and reliability.

Industry dummy. A dummy variable was set to equal 1 if a firm belongs to a particular industry, while other industries were designated as zero. The industry classification is based on the website Startup Thailand[3].

Number of employees was measured as a logarithm of the number of firm employees (Schoute, 2011).

Firm revenue was measured using annual sales revenue as used in similar prior studies (e.g., Al-Omiri and Drury, 2007; Kallunki and Silvola, 2008; Pavlatos and Paggios, 2009). The dummy variable set to equal 1 if the firm had a particular annual sales revenue and was otherwise set as zero.

Advanced costing systems. This measurement was adopted from Ekbatani and Sangeladji (2011). The respondents were asked to indicate whether their firm adopted an advanced costing system or not. The dummy variable was set to equal 1 if a firm adopted an advanced costing system, and zero if no advanced costing system was adopted.

3.4 Method of Analysis

The purpose of the study was to determine which factors affected the adoption of advanced costing systems in startup companies; therefore, it was decided to use logistic regression to examine this relationship. Logistic regression is appropriate to explain the relationship between a categorical response variable and predictor variables. Candidate predictor variables can follow an interval scale or ratio scale and be either dichotomous or continuous variables. Logistic regression is performed to predict and explain a binary (two-group) category variable, which is constituted by adoption and non-adoption in this study (Hair et al., 2010).

Before running the logistic regression, continuous variables were mean-centered. The correlation between the variables was also tested to determine whether multicollinearity was present (see Table 2). The logistic regression model was performed in SPSS for Windows. To test the hypotheses, the following model was applied for two different measures of the dependent variable.

$$P(\text{Adopt}) = b_0 + b_1\text{Firm age} + b_2\text{NumerousProduct/Service diversity} + b_3\text{Strategy} + b_4\text{PEU} + b_5\text{Business\_ServiceTech} + b_6\text{IndustryTech} + b_7\text{TravelTech} + b_8\text{GovTech\_EdTech} + b_9\text{FinTech} + b_{10}\text{HealthTech} + b_{11}\text{Lifestyle\_EntertainmentTech} + b_{12}\text{PropertyTech} + b_{13}\text{AgriTech} + b_{14}\text{Firm revenueLess1M} + b_{15}\text{Firm revenue1-5M} + b_{16}\text{Firm revenue6-10M} + b_{17}\text{Firm revenue11-20M} + b_{18}\text{Number of employees}$$

[3]Website Startup Thailand is a national startup promotion platform implemented to support and encourage startup growth and startup ecosystem in Thailand leading by the Ministry of Science and Technology of Thailand.

Table 1 Descriptive Statistics

Variable	(N)	%	Min	Max	Mean	SD	Factor Loading	Eigen-value	Cron-bach's Alpha
Independent variable									
1. Firm Age	203		1.00	23.00	3.70	4.18			
2. Product/Service diversity									
Only 1 product/service	97	47.8							
Numerous products/services	106	52.2							
3. Strategy									
1) Price (STG1)	203		2	7	5.68	1.43	0.70		
2) R&D (STG2)	203		2	7	5.47	1.34	0.76		
3) Marketing (STG3)	203		2	7	5.49	1.29	0.80		0.90
4) Quality (STG4)	203		2	7	6.05	1.26	0.86		
5) Image (STG5)	203		2	7	6.04	1.26	0.90		
6) Appearance (STG6)	203		1	7	6.06	1.26	0.90		
4. Perceived Environmental Uncertainty									
1) PEU1	203		1	7	4.85	1.45	0.72		
2) PEU2	203		1	7	5.00	1.39	0.65		
3) PEU3	203		1	7	4.28	1.33	0.80		
4) PEU4	203		1	7	4.77	1.31	0.65	4.663	0.86
5) PEU5	203		1	7	4.81	1.27	0.68		
6) PEU6	203		1	7	3.97	1.68	0.72		
7) PEU7	203		1	7	4.27	1.53	0.78		
8) PEU8	203		1	7	4.11	1.56	0.75		
5. Industry									
Business and ServiceTech	61	30.0							
IndustryTech	14	6.9							
TravelTech	16	7.9							
GovTech and EdTech	8	3.9							
FinTech	8	3.9							
HealthTech	24	11.8							
Lifestyle and EntertainmentTech	25	12.3							
PropertyTech	3	1.5							
AgriTech	30	14.8							
Others	14	6.9							
6. Number of Employees	203		1	40	8.53	7.05			
7. Firm revenue (Annual sale)									
Less than 1 million baht	117	57.6							
1–5 million baht	51	25.1							
6–10 million baht	14	6.9							
11–20 million baht	8	3.9							
More than 20 million baht	13	6.4							
Dependent variable									
8. Advanced costing systems									
Non-Adopt (0)	80	39.4							
Adopt (1)	123	60.6							
-Activity Based Costing	36	17.7							
-Target Costing	49	24.1							
-Product Life Cycle Costing	21	10.3							
-Activity Based Management	17	8.4							

Since logistic regression is concerned with non-normal distribution, Probit regression was also employed as a robustness check, to confirm the significance of the results. The Probit regression was also performed in SPSS for Windows.

4. RESULTS

4.1 Descriptive Statistics

The descriptive statistics in table 1 show that the respondents came from various types of industry in which the three greatest majorities came from the business and serviceTech industry (30%), AgriTech (14.8%), and Lifestyle and EntertainmentTech (12.3%), respectively. The average age of the companies was three years (mean 3.7), while the most common number of full-time employees in the company was between 1 and 40. Most of the respondents' companies had revenue of less than 1 million baht (57.6%) and were involved in selling numerous products or services (52.2%).

Regarding the independent variables, strategy had a minimum value of 2 and a maximum value of 7, with the mean and standard deviation being close to 6 and 1 respectively. Secondly, perceived environmental uncertainty had a minimum of 1 and maximum of 7, with a mean and standard deviation of around 4 and 1 respectively.

Regarding the dependent variable of advanced costing system, the majority of respondents were found to have adopted an advanced costing system (60.6%); the total 60.6% consisted of target costing 24.1%, activity-based costing 17.7%, product life cycle costing 10.3%, and activity-based management 8.4%.

4.2.1 Correlation

Table 2 presents the correlations. We found that product or service diversity and perceived environmental uncertainty are positively correlated with advanced costing systems at $P < 0.05$ and $P < 0.01$, respectively. On the contrary, strategy was negatively correlated with advanced costing systems at $P< 0.05$.

With respect to a multicollinearity measurement, none of the correlation coefficients were high (lower than 0.8). The tolerance scores of the variables ranged from 0.407 to 0.832 which are all below the cut-off of 1.00 (Hair et al., 2010). The variance inflation factor (VIF) ranges from 1.202 to 2.459, which is well below the threshold of 5 (Hair et al., 2010). Therefore, there is no multicollinearity problem in our study.

4.2.2 The Antecedents on the Adoption of Advanced Costing Systems in Startup Companies in Thailand

Table 3 presents the results of the antecedents on the adoption of advanced costing systems in startup companies in Thailand relying on logistic regression analysis. The results in table 3 illustrate that there is a significant negative relationship between firm age and the adoption of advanced costing systems ($\beta = -0.136$, $P < 0.05$). That is, when the value of firm age increases by 1, the probability of adopting advanced costing systems decreases by -0.136. The odds ratio is 0.873. These results imply that older firms are less likely to adopt advanced costing systems than younger firms by 0.873 times. The results are contrary to the postulated hypothesis, which was suggestive that larger and older firms with accumulated wealth and knowledge were more likely to adopt advanced costing. In contrast to prior work (Bjørnenak, 1997; Krumwiede, 1998; Chenhall and Langfield-Smith, 1998; and Malmi, 1999), this study finds that younger firms are more proactive in adopting advanced costing systems. One explanation for this finding may be that younger firms are more agile and have no sunk costs in legacy systems, which possibly impedes the older firms in switching from existing costing systems to newer advanced systems. Meanwhile, product or service diversity was found to have a significant positive relationship with the adoption of advanced costing systems ($\beta = 1.061$, $P < 0.05$). When the value of product or service diversity increases by 1,

Table 2 Correlation Matrix

Variables	ACS	Firm age	Product/service Diversity	Strategy	PEU	Industry	Firm Revenue	Employee	Tolerance	VIF
ACS	1	0.012	0.146*	-0.165*	0.325**	-0.028	-0.017	0.040	0.801	1.248
Firm age	0.012	1	-0.263**	-0.102	0.156*	0.190**	0.512**	0.417**	0.614	1.628
Product/ Service Diversity	0.146*	-0.263**	1	0.055	0.071	-0.260**	-0.163*	-0.232**	0.819	1.221
Strategy	-0.165*	-0.102	0.055	1	0.273**	-0.064	0.003	0.084	0.729	1.372
PEU	0.325**	0.156*	0.071	0.273**	1	-0.016	0.033	0.158*	0.729	1.372
Industry	-0.028	0.190**	-0.260**	-0.064	-0.016	1	-0.135	-0.110	0.832	1.202
Firm Revenue	-0.017	0.512**	-0.163*	0.003	0.033	-0.135	1	0.714**	0.407	2.459
Employee	0.040	0.417**	-0.232**	0.084	0.158*	-0.110	0.714**	1	0.448	2.230

Note 1. N = 203

2. *. Correlation is significant at the 0.05 level (2-tailed).

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

Table 3 Logistic regression results

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Firm age	-0.136	0.058	5.496	1	0.019*	0.873
	Product_ServiceDiversity(1)	1.061	0.442	5.777	1	0.016*	2.890
	Strategy	-0.665	0.196	11.473	1	<0.001**	0.514
	PEU	0.758	0.217	12.205	1	<0.001**	2.134
	Industry(1)	-0.133	0.817	0.026	1	0.871	0.876
	Industry(2)	-1.169	0.769	2.312	1	0.128	0.311
	Industry(3)	0.940	1.228	0.586	1	0.444	2.561
	Industry(4)	1.594	1.191	1.792	1	0.181	4.925
	Industry(5)	-0.606	0.612	0.979	1	0.322	0.546
	Industry(6)	0.217	0.646	0.112	1	0.737	1.242
	Industry(7)	0.737	1.503	0.241	1	0.624	2.090
	Industry(8)	0.652	0.570	1.311	1	0.252	1.920
	Industry(9)	1.255	0.825	2.314	1	0.128	3.508
	Firm Revenue(1)	1.805	0.578	9.737	1	0.002**	6.079
	Firm Revenue(2)	2.164	1.010	4.586	1	0.032*	8.705
	Firm Revenue(3)	-1.064	1.074	0.980	1	0.322	0.345
	Firm Revenue(4)	-1.533	1.111	1.904	1	0.168	0.216
	Employee	0.085	0.044	3.787	1	0.052	1.089
	Constant	0.109	1.200	0.008	1	0.928	1.115

a. Variable(s) entered on step 1: Firm age, Strategy, PEU, Industry, Firm Revenue, Employee, Product_ServiceDiversity.

* is significant at the 0.05 level (2-tailed).

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

the probability of adopting advanced costing systems increases by 1.061. The odds ratio is 2.890. This means that firms which have numerous types of products or services are 2.890 times more likely to adopt advanced costing systems than firms that have only 1 type of product or service. This result is similar to that of Kaplan and Cooper (1988), Gosselin (1997), and Cagwin and Bouwman (2002). Therefore, hypothesis 2 is accepted. In addition, strategy also plays an important role in the adoption of advanced costing systems, as it was found that strategy has a significant effect ($\beta = -0.665$, $P < 0.01$). When the value of strategy increases by 1, the probability of adopting an advanced costing system decreases by 0.665. The odds ratio of the strategy variable is 0.514. This demonstrates that firms which implemented a low-cost strategy are more likely to adopt advanced costing systems than firms that implemented a differentiation strategy by 0.514 times. Lastly, a significant positively result was found between perceived environmental uncertainty and the adoption of advanced costing systems ($\beta = 0.758$, $P < 0.01$). When perceived environmental uncertainty increases by 1, the probability of adopting an advanced costing system increases by = 0.758. The odds ratio of perceived environmental uncertainty is 2.134. This demonstrates that when firms confront high environmental uncertainty, they are 2.134 times more likely to adopt advanced costing systems than firms facing low environmental uncertainty. Therefore, hypotheses 3 and 4 are accepted. These results align with the findings of Al-Sayed and Dugdale (2016).

With respect to control variables, it was found that the level of firm revenue has a significant relationship with the adoption of advanced costing systems at $P < 0.01$. More precisely, firms that have an annual revenue of less than 1 million baht are more likely to adopt an advanced costing system ($\beta = 1.805$, $P < 0.01$). When the value of the firm's annual revenue is less than 1 million baht, the probability of adopting an advanced costing system increases by 1.805. The associated odds ratio is 6.079. This means that firms that have annual revenue of less than 1 million baht are 6.079 times more likely to adopt an advanced costing system than others. Moreover, it was found that firms' annual revenue was significantly associated with the adoption of advanced costing systems ($\beta = 2.164$, $P < 0.05$), with an odds ratio of 8.705. This means that firms with an annual revenue of 1–5 million are 8.705 times more likely to adopt an advanced costing system than others.

The results presented in Table 4 illustrate that all independent variables can explain a dependent variable at a significance level of 0.05 ($P < 0.01$). Regarding model fit, the -2 Log likelihood in table 5 gives a smaller value (194.977), indicating adequate model fit (Hair et al., 2010). Next for predictive accuracy, the classification table in table 6 shows 80.80 at the cut-off point of 0.5, indicating that the statistical test of overall predictive accuracy is based on the correspondence of actual and predicted values of the dependent variable (Hair et al., 2019). This indicates that the model can predict the likelihood of the adoption of advanced costing systems with an accuracy of 80.80%. The coefficient of determination (R2 value) was also assessed. As seen in Table 5, it was found that the Cox & Snell R Square is 0.317 and the Nagelkerke R Square is 0.429, indicating that the independent variables are able to explain variation in almost one-half of the dependent variables in the model.

4.3 Robustness Check

When the Probit regression is analyzed in SPSS, the significant results still remain. Moreover, analysis of the logistic regression in STATA indicated that the significant results are in the same line with the results in SPSS.

4.4 Additional Analysis

Firstly, two-way tabulation was performed in investigating the relationship between the adoption of advanced costing systems and Thai startup firms' circumstances.

The results confirm the results of the logistic regression. The two-way tabulation results reveal that a younger company (company age between 1-5 years) is more likely to adopt an advanced costing system. A company who implements a low-cost strategy and is faced with high environmental uncertainty intends to adopt an advanced costing system. Furthermore, the results also show that a company who has annual revenue of less than five million baht has higher intention to adopt an advanced costing system. Finally, a company which has a wider range of products or services (greater diversity) is more likely to adopt an advanced costing system.

Furthermore, a multinomial analysis was conducted to find the relationship among different types of advanced costing systems and significant independent variables. Firstly, strategy was found to have a significant negative correlation with the adoption of activity-based costing at $P < 0.01$ ($\beta = -1.317$, $P < 0.01$), with an odds ratio of 3.733. This means that firms which implement a low-cost strategy are 3.733 times more likely to adopt activity-based costing than firms which implement a differentiation strategy. Next, it was found that strategy has a significant negative correlation with the adoption of target costing ($\beta = -0.986$, $P < 0.05$), with an odds ratio of 2.682. This implies that firms which implement a low-cost strategy are 2.682 times more likely to adopt target costing than firms which implement a differentiation strategy. Finally, it was found that firm age has a significant positive correlation with the adoption of product life cycle costing ($\beta = 0.348$, $P < 0.05$), with an odds ratio of 1.417. This implies that larger firms are 1.417 times more likely to adopt product life cycle costing than smaller firms. With respect to model reliability, the Cox & Snell R Square and Nagelkerke R Square show results of 0.629 and 0.665 respectively. These results indicate that the independent variables can explain more than 60% of the variation of the dependent variable in the model. The -2 Log likelihood is a small value (391.306), indicating an adequate model fit.

Table 4 Omnibus Tests of Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	77.263	18	<0.001
	Block	77.263	18	<0.001
	Model	77.263	18	<0.001

Note: Significant level is .05.

Table 5 Model Summary

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	194.977[a]	0.317	0.429

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 6 Classification Table

Classification Table[a]

			Predicted		
			Advanced Cost		
	Observed		.00	1.00	Percentage Correct
Step 1	Advanced Cost	.00	58	22	72.5
		1.00	17	106	86.2
	Overall Percentage				80.8

a. The cut value is .500

5. CONCLUSION AND DISCUSSION

The purpose of this study was to investigate the factors that influence the adoption of advanced costing systems in start-up companies in Thailand. Contingency theory was used as the lens to explore the relationships between the factors and the adoption of advanced costing systems. A total of 203 completed surveys were returned from the 232 Thai start-up companies which the surveys were originally distributed to, yielding a response rate of 87.5%. Logistic regression was used to perform the analysis. The results revealed a significant negative relationship between both firm age and strategy with the adoption of advanced costing systems in a startup company in Thailand. Results also revealed a significant positive relationship between the variables of product or service diversity, and perceived environmental uncertainty, and the adoption of advanced costing systems in startup companies in Thailand. Therefore, younger firms and firms implementing a low-cost strategy tend to adopt advanced costing systems more than older firms or firms implementing a differentiation strategy. Moreover, firms that possess a high level of product or service diversity, or which face a high level of perceived environmental uncertainty are more likely to adopt advanced costing systems than those which possess a low level of product or service diversity, and which face a low level of perceived environmental uncertainty. Overall, the research findings provide evidence to support contingency factors in the design and adoption of management accounting systems and techniques. In other words, firms will choose situationally appropriate management accounting systems and techniques in order to create a good fit with their organizational circumstances (Galbraith, 1973).

These results contribute to two perspectives. Firstly, the study contributes to management accounting research by revealing the variables that are associated with the adoption of advanced costing systems in startup companies in Thailand. Secondly, the study has practical implications, as there is no guarantee that all management accounting techniques are equally suitable for the sustainable operation of Thai startup companies. Startup companies must carefully select management accounting techniques that are congruent with their organizational circumstances. If companies make the right choice, namely one that is appropriate for their specific setting and context it is likely they will be able to enhance decision-making and thereby increase the firm's performance and in turn the likelihood of long-term survival. Moreover, for startup companies who are searching for management accounting techniques to adopt, the research findings can guide be used to successfully implement appropriate systems and do so effectively and with fewer problems.

Lastly, it is worth noting the shortcoming of this study, in that it did not consider firm performance. Future studies may investigate the relationship between the adoption of advanced costing systems or techniques and firm performance whilst also exploring various contingency variables for Thailand startups. Secondly, it is highlighted that there are limits to the generalizability of the research findings beyond the current setting, and due to its static nature in deployment of a survey-based study at one particular point in time. Further studies may employ case studies to explore deeper nuances of the relationships identified between the antecedents and the adoption of advanced costing systems in startup companies. Thirdly, contingency theory (concept of fit) was used in the design of the management accounting practices, relying on the firm's circumstances to formulate hypothesis testing. However, future studies may use a technology adoption framework to investigate the relationship between the adoption of technology and the adoption of advanced costing systems in startups. Lastly, data collection was carried out during the COVID-19 pandemic. This is a period in which firms faced considerable financial hardship; hence this may distort the results. Further study may investigate the

adoption of advanced costing systems in pre and post COVID-19 pandemic periods, as well as compare the results across these two periods.

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