The influence of start-up entrepreneurship and disruptive business model on firm performance

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A B S T R A C T
Objective: This research aims to develop the constructs and to study the causal relationship between start-up entrepreneurship (SUE), disruptive business models (DBM), and firm performance (FPF) of start-ups in Thailand.
Research Design & Methods: A quantitative research, a total of 186 samples from start-ups in Thailand. Data were collected by using online questionnaires with an entrepreneur/start-up founder/co-founder per company. The data were analysed through structural equation modelling.
Findings: The new dimensions of SUE, DBM, and FPF reach a decent level of structural credibility and are suitable for measurement. SUE and DBM had a positive influence on FPF, while SUE had a positive influence on DBM as well.
Implications & Recommendations: The results could be used to advance the potential of start-up entrepreneurs, strengthen the existing business model, or decide to develop a new business model that could develop brand new products/services in the markets to meet customer needs that change with technology advancements.
Contribution & Value Added: The dimensions of the newly developed SUE, DBM, and FPF could be developed dynamically. These new dimensions have contributed to SUE acting as a mechanism of DBM development. The finding show that the new dimensions could be used to develop start-ups; to begin with, the new business model generation, technology-driven products/services development to meet the customer needs and seeking investors network. Thus, the impact of DBM will be strengthened, and the impact of FPF can gain a competitive advantage and improve profitability, as start-ups introduce a new business model with technological innovation that will redefine industries and restructure the economy.

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INTRODUCTION

Over the past decade, information technology and innovation development as well as digital technology advancement have played an important role in developing and changing business operations completely (Niyawanont, 2022) making them different from the traditional business model that was interrupted by technology (Christensen, 1997). One of the businesses that benefit from this situation is a 'start-up' which is a business founded to seek a business model that can build up the business by leaps and bounds by seeking a repeatable, scalable business model driven by technology or innovation that can generate income (Blank & Dorf, 2012).

The repeatable and scalable business model is attractive to entrepreneurs and investors, especially start-ups that offer products and services over the internet and have a good chance of creating a repeatable business model (Ries, 2011). This allows start-ups to become scalable businesses without expanding the organization. Modern information technology helps companies to be able to serve

millions of customers without employing thousands of people (Blank & Dorf, 2012). For example, if a start-up is primarily internet-based, it can be run internationally with a single office. This leads to excellent cost performance. As the start-up is able to serve a large group of clients while being run by a few engineers, the impact of repeatable capability will be further enhanced if the products/services or a new business model are starting to replace the existing model in the market (Hyrkäs, 2016). Technology is a key factor that enables entrepreneurs to create new ways to seek opportunities from supply and demand. It is particularly well suited to Schumpeter's (1991) entrepreneurship realizing the opportunity not only to create a new company but also to bring technological innovation and a new business model to life, reshaping industries and restructuring the economy (Adler *et al*., 2019) and the idea of how entrepreneurship acts as a mechanism of 'creative destruction' (Schumpeter, 1991), a concept which was initially the concept before being developed as a concept of 'disruption' (Christensen, 1997). However, new innovations which will bring start-ups success will not come easily because innovation will not be needed without the public acceptance. Therefore, the future is uncertain, start-ups are pushed to run under uncertainty as to whether the business will be profitable or not (Cantamessa *et al*., 2018; Aminova, & Marchi, 2021). A start-up could only go on when founders and investors in some cases believe that it can succeed. Interestingly, start-ups are still temporary organizations (Blank, 2020). After being successful with a product or service, a start-up will take some steps to become a more 'serious' company (Hyrkäs, 2016) by being acquired by a large corporation or entering the stock market by offering shares to the public.

When comparing the general economic conditions with the performance of start-ups, many of them in Thailand have been supported quite well. The 2021 investment in start-ups in Thailand was USD 318.54 million (Techsauce, 2022). Start-up investment incurs a very low cost of website/application development. With the founder's investment and minimal cost risk, usually less than USD 1 million, these start-ups are in the early stages of start-up scaling and finding a repeatable and scalable business model is a must for them. Scaling requires external investment to fuel rapid expansion (Blank & Dorf, 2012). The five start-ups with the most investments were business service, fintech, health tech, ed tech, and food/agri tech. In 2020, the investment in start-ups in Thailand amounted to USD 376.71 million, making it the year for Thailand with the highest investment in start-ups in nine years. Overall fundraising in industries that were positively impacted by the COVID-19 pandemic were still doing well, such as Logistics, e-Commerce, especially for business services that offer digital transformation services to organizations, allowing businesses to conduct online transactions. On the other hand, the negatively affected groups have no signs of recovery, especially in tourism, which has been affected by the COVID-19 pandemic. Moreover, people's purchasing power has been declining (Techsauce, 2022). While in Southeast Asia, according to the e-Conomy SEA 2020 report, the investment value has been trending down since 2018 (Google, Temasek, & Bain Company, 2020).

Sometimes, starting a new business by a few individuals with a new economically feasible product could meet market demands in line with rapidly changing technology advancements and vision for business growth and expansion. The vision for growth and expansion is a result of a product component which is innovative, strongly demand-based, and can be quickly scaled (Ries, 2011; Frederiksen, & Brem, 2017; Kim, Kim, & Jeon, 2018). However, the research problems came from the truth that most start-ups fail to realize the success they are aiming for (Aminova, & Marchi 2021; Thanapongporn *et al*., 2021). Furthermore, funded start-ups tend to disappear after five years. Most start-ups survive with their investments while three-quarters of start-ups are unable to gain a return on their investments (Gage, 2012; Cantamessa *et al*., 2018; Aminova, & Marchi, 2021). This may affect the perception of new entrepreneurs and investors. The research focuses on Thailand. Thai government formed the Thailand 4.0 policy with the aim of making Thailand a high-income country and helping it escape the middle-income trap. Thus, the government has policies to drive the economy through innovation, promoting and supporting investment and research to create new start-ups and increase their economic value. This makes start-ups in Thailand even more important (Wisuttisak, 2021; Jeamwittayanukul *et al*., 2022) as the country aims to become the perfect Start-up Nation and readiness to become the Global Start-up Hub (National Innovation Agency, 2022). Hence, this research aims to develop the constructs of start-up entrepreneurship (SUE), disruptive business model (DBM), and firm performance

(FPF) which is suitable for start-up assessment and exploring influence paths. The intention behind it is to obtain useful information on the potential development of start-ups and business models to be competitive and successful in order for start-ups to be able to survive by taking advantage of the disruption in the economy which is constantly changing through technological advancements.

The next section is the literature review to develop the hypothesis. The following is the research method to explain the sampling, data collection, instrument, and data analysis. Then, the results and discussion present the findings. Finally, the conclusions explain the research contribution, research limitations, and suggestions for future research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Start-up entrepreneurship (SUE)

Start-up is a business founded to seek a business model and build up the business by leaps and bounds by seeking a repeatable, scalable business model (Blank & Dorf, 2012). Rise (2011) describes a start-up as an organization that launches new products and services over uncertainty. Moreover, a start-up is a new venture with a commitment of high income and high potential to change the competition through innovative ideas (Hyrkäs, 2016; Adler *et al*., 2019). This research defined a start-up as a new venture that can change the technology-driven business model to meet the need of customers' behaviours that change according to the technology advancement through products and services introducing the new way of using technology to do things that facilitate and solve the everyday problems. Research on Schumpeterian entrepreneurship states that high-growth start-ups are the key factors in innovative technology and economic growth (Adler *et al*., 2019). Hence, this research investigated entrepreneurs who drive the creation of start-ups.

The SUE refers to people who see an opportunity to start a business and can make it grow by leaps and bounds by seeking a revenue-generating business model which is profitably repeatable and scalable (Blank & Dorf, 2012). In that context, while being an entrepreneur, it is expected to face challenges in driving a business by creating a new business model which is an easy way to expand it. The challenges of market volatility and the fundamentals of start-up development include the challenge of expanding the market from early adopters to the main market. The importance of understanding customers from a business perspective and collecting data and insights from unmet customer needs is also part of it (Osterwalder *et al*., 2014).

In the past research, SUE has been studied in terms of business activities, the usage of information technology innovation, and new ways to use technology to do new things as well as new joint ventures with high income-generating capabilities and high potential to use new innovations to change the way of competition (Hyrkäs, 2016). However, SUE has not been clearly developed as a specific dimension. Therefore, this research will develop new SUE's dimensions from two established traditional concepts of entrepreneurship: (1) entrepreneurial orientation (EO) and (2) entrepreneurial self-efficacy (ESE).

Lumpkin and Dess (1996) presented EO as the processes and practices that lead to a new business establishment from ESE. McGee *et al*. (2009) presented ESE that came up with four entrepreneur's tasks in the new business developing process: searching; planning; marshalling; implementing.

Covin and Slevin (1989) studied three key important components to study EO including two behaviours: innovativeness; pro-activeness; and one attitude which is risk-taking. Innovativeness creates new products and services or new technologies while pro-activeness reflects the attitude towards seeking new opportunities in business continuity, while risk-taking refers to the determination to invest and the acceptance of resource commitments with uncertain returns. Then, there was agreement that the entrepreneurship study goal has multiple dimensions and each component does not necessarily occur at the same time. Two additional factors are presented: competitive aggressiveness; and autonomy (Lampkin & Dess, 1996). Both have the potential to support creative processes that increase the capacity for innovation. However, entrepreneurial activities are all about finding the suitability of products, customers, markets and channels of distribution in order to come up with the best business model (Yang *et al*., 2018). Consequently, the components from these two entrepreneurial education concepts are suitable for the SUE dimensions development to further study the DBM and FPF influence pathways.

Disruptive business model (DBM)

The business model describes the rationale of how an organization creates, delivers, and captures value (Osterwalder & Pigneur, 2010). Meanwhile, DBM arises along with technology and innovation (Christensen, 1997) and it refers to an emerging business model that replaces the existing business. It happens when the existing industry faces business challenges that provide greater value to customers with which the company's existing business models can directly compete (Rogers, 2016). It transforms the existing business model into a new business model delivering an unprecedented product or service (Karimi & Walter, 2016).

An Austrian economist, Joseph Schumpeter, was the first theorist of the business disruption concept, but he did not use the term. His writings regard a phenomenon known as 'creative destruction,' a phenomenon that undermines the old system of industrial capitalism and the economic system in the creation process of new innovations. He uses it to describe the arrival of the train to the Midwestern United States by Illinois Central (Schumpeter, 1991). Later, Clayton Christensen (1997) presented a theory of 'disruption,' and thus, he became the person to use the term to describe the 'disruptive technology' theory which later on was expanded to 'disruptive innovation' in *The Innovator's Dilemma*. Chesbrough and Rosenbloom (2002) state that the new business model exposes the underlying value of technology when technological advances can shape new consumption patterns with new technologies to increase competitiveness, change relationships with customers, and present value. The new business model reveals the hidden value of technology and it can link technical potential and the realization of economic value, thus, creating 'a new business model that affects the old business model to adapt. If it cannot adapt, the new business model will replace them until the old ones quickly disappear' (business disruption) (Chesbrough & Rosenbloom, 2002). Likewise, the business model innovation concept aims to replace the existing business model with a new model for an unprecedented offering of products/services. Such a replacement may be, for example, a gradual transition from the existing business model to the new model (Cavalcante *et al.*, 2011; Sabatini, Cucculelli, & Gregori, 2022).

From an entrepreneur's perspective, the business model is the central construct of an organization to represent a strategic framework for defining the concept of a value-based venture, and the business model is expected to emerge and evolve over time (Morris, Schindehutteb, & Allen, 2005). The business model reflects consumer needs, delivery of value, creation of new demands for consumers, the process of holding the value of goods and services and profitability (Teece, 2010). Meanwhile, Rogers (2016) presents the theory of 'disruption' that applies to business models and has different definitions because of its tendency to be used as a strategy tool. Rogers defines a 'business model' as a business model that describes an overall view of a business that creates value, delivers to the market, and then gets the value back.

However, DBM is not for every organization. An organization which is suitable and is important to the success of the disruptive business will need a leader who can maintain or improve profit margins and lead the business to survive in the industry (Sonthiprasat, 2014). As this study focused on DBM with 'start-up,' an established business to find profitable, repeatable and scalable business models (Blank & Dorf, 2012), therefore, this research will develop dimensions of DBM that are suitable for start-ups.

According to the literature review, entrepreneurship is all about business creation and investment in new businesses such as self-employment, new business establishment, business expansion by an individual, a team, or a sub-business establishment. Entrepreneurship is therefore defined as a part of discovering, evaluating, using the opportunity to offer new products and services by effectively managing the organization, marketing, process, and raw materials to gain profits that will enable the business to survive. In this research, SUE will develop new dimensions from two traditional concepts of entrepreneurship: ESE and EO. Both are recognized as the process of decision-making, creating new things, developing and introducing new ideas that promote product and service development (Shan, Song, & Ju, 2016) as they signify a useful path to start a business in order to build business models, strategies and define products/services (Karimi & Walter, 2016). And ESE in doing business is useful

for preparation to start a business, build a business model, determine the company's strategy, and products/services (McGee *et al.*, 2009). Hence, the hypothesis will be as follows:

H1: SUE has a positive direct effect on DBM.

Firm performance (FPF)

Performance appraisal is fundamental to achieving organizational success. Performance analysis investigates how to determine and compare the level of achievement of actual objectives (Yang, 2012). When it comes to analysing performance appraisal systems, it is difficult to use qualitative evaluation because it is often vague, however, numerical results alone may not adequately describe the system of performance appraisals. Nowadays, the business environment is rapidly changing, thus making it necessary for companies to continually seek new opportunities in order to increase uncertain profits from existing operations, to promote the performance of companies where they turn time into profit by responding to customer needs immediately or quickly, and to determine industry standards and brand awareness to help create a competitive advantage and help adapt quickly to the market demands in a competitive environment (Shan, Song, & Ju, 2016).

All of the literature regarding entrepreneurship recognizes the importance of OE in order to survive and FPF by Lumpkin and Dess (1996). In short, OE is a process and practice which leads to establishing a new business through ESE. It helps the organizations perform better than competitors, gain a competitive advantage, be able to see innovative opportunities that could get high returns, and determine the target market and be the first to enter the market (Mapalala, 2017).

However, a start-up's FPF evaluation, a financial metric is a factor of start-up success as well as the income and investment received (Phangestu *et al.*, 2020). As a 'start-up' is an established business to find profitable, repeatable and scalable business models (Blank & Dorf, 2012), therefore, SUE is the engine of growth that drives DBM in order to develop better products/services. This will allow the start-up performance to gain profit and advantages over competitors as well as the ability to survive in a highly competitive industry. Therefore, this research will develop the FPF dimensions that are suitable for the start-ups study.

In this research, SUE was used to develop new dimensions from ESE and EO, where entrepreneurship was the focus in order to study the success factors in start-ups and the impact of entrepreneurial strategic processes on organizational performance (Shan, Song, & Ju, 2016). Meanwhile, ESE is a reflection of an individual's trust towards the capability in controlling their own motivations and behaviours to get the job done and towards organizing the intellectual resources and strategies which are necessary to an effective operation. Yunusa *et al.* (2022) studied ESE influencing the interaction between entrepreneurship and business performance. The results confirmed that ESE and EO positively affect the performance of small and medium businesses. Hence, the hypothesis will be as follows:

H2: SUE has a positive direct effect on FPF.

At the same time, DBM in this research will develop new dimensions from the overall DBM concept that does not separate components. According to research, DBM is used as an intermediate variable (Karimi & Walter, 2016; Phangestu *et al.*, 2020) Between entrepreneurial concepts and FPF in a study of the transition from the existing business model to the new business model in offering unprecedented products and services, it is necessary to be aware of the economic value and to explore and understand different customer needs (Karimi & Walter, 2016). However, the activities of a start-up operation, the entrepreneurs completely take part in seeking a viable business model which leads to a better performance in the final business operation (Yang *et al.*, 2018). Hence, the hypothesis will be as follows:

H3: DBM has a positive direct effect on FPF.

Therefore, the research developed the conceptual framework and research hypothesis as shown in Figure 1 to study the causal relation between SUE, DBM, and FPF. The details of the research hypothesis development are as follows.
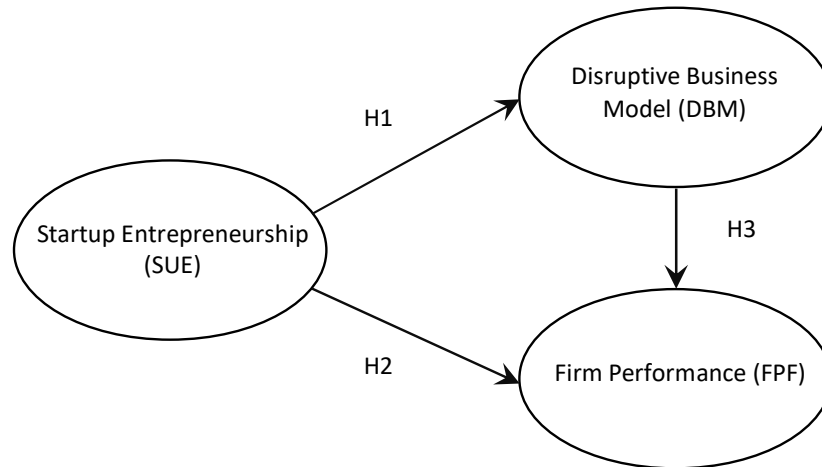
Figure 1. Research frameworks
Source: own elaboration.

RESEARCH METHODOLOGY

Sampling and Data Collection

The population and sample in this research are start-ups in Thailand. The start-ups' name lists were obtained from a publicly accessible database on the website of Startup Thailand, a government agency that supports and inspires start-ups as a new venture that can change the technology-driven business model to meet the need of customers through products and services delivering a new way of using technology to do new things that facilitate and solve the everyday problems. There was a total of 536 start-ups registered in the Thailand start-up ecosystem, whose firms were formed in the pre-seed growth phase (a phase of incubation, that has a good idea emphasis on prototype product/service creation) to the series C growth phase (a phase of the expansion of the company and expanding the customer base to regional and global levels). The data was collected using an online questionnaire with the entire population from February to August 2022. The target group was an entrepreneur, founder/co-founder, one person per start-up. A total of 189 samples was collected (35.26% response rate). Ultimately, 100-200 samples fell under the sample group, which according to the analysis of the structural equation model, was a good level of reliability (Hair *et al.*, 2014).

Instruments

The research instruments were a questionnaire based on the knowledge from the review of the literature. The questionnaire consisted of four parts which required respondents' opinions on the following concepts:

Part 1: General information on a start-up. It came in the form of a check-list questionnaire, which were (1) the main industry of the start-up, (2) the growth stage of the start-up, (3) the company's funding source (investment funds or investors), (4) the value from fundraising, and (5) the duration of the incorporation starting from concept test to present.

Part 2 SUE-related questions. A total of thirty-three questions required the respondents' opinion on the start-up's SUE which was elaborated based on McGee *et al.* (2009); Karimi and Walter, (2016); Mapalala (2017); Shan, Song, and Ju (2016).

Part 3 DBM-related questions consisted of nine questions that required the respondents' opinion on the start-up's DBM which was elaborated based on Osiyevskyy and Dewald (2015); Sonthiprasat (2014); Karimi and Walter (2016).

Part 4 FPF-related questions. The respondents were required to comment on six questions about FPF which was elaborated based on Shan, Song and Ju (2016).

The questions required respondents' opinion in the form of a numerical rating using the 7-pointed Likert scale. This required the respondents to rate the variables divided into 7 levels, where 1 means strongly disagree and 7 means strongly agree.

Developing a measurement model which covers the research objectives and conceptual frameworks by selecting questions from research that has been studied before and translating the questions from the original English text into Thai, then adjusting the questions to fit the context of the technology-driven start-up. The translated version then was reviewed and assured content validity by the assistance of four experts on the content and the use of language in communication. The result of the assessment of the IOC = 0.95 (Rovinelli & Hambleton, 1977) which indicates that the questions were considered matching with the content and alignment with the assessment objectives.

The questionnaire reliability validity testing was done by the researcher with the respondents who were similar to a sample in a total of 30 sets using convenience sampling while testing the reliability of the questionnaire was done using Cronbach's Alpha coefficient analysis method. It was found that SUE = 0.934, DBM = 0.961 and FPF = 0.902, all of which were greater than 0.800, indicating that the measurement model was in a very good level of reliability (George & Mallery, 2016).

Data Verification Before Analysis

Multivariate outlier checking is the determination of abnormal highs or lows using the Mahalanobis distance (D^2) statistic (Mahalanobis, 1936). Any data set with a p-value lower than 0.001 (Hair *et al.*, 2014) is discarded due to multivariate outliers. According to the examination of the multivariate outlier, it was found that there were three data with the D^2 = 147.103, 91.005, and 183.005, so all of the p-value = 0.000 respectively, which was considered as multivariate outliers, therefore the said data was eliminated. Thus, there was a total of 186 data for the analysis.

The normal distribution and its characteristics have been verified by skewness-kurtosis values for each variable (Tabachnick, Fidell, & Ullman, 2007). According to the analysis, all data had skewness and the kurtosis in the range of -3.00 to +3.00, which indicates a normal distribution (Kline, 2015).

Data Analysis

Structural equation modelling (SEM) with AMOS: exploratory factor analysis (EFA) was used to develop observable variables or questions into an appropriate measurement model of SUE, DBM, and FPF. This aimed to develop constructs and analyze the relationship structure of the components of each such variable.

Confirmatory factor analysis (CFA) was used to confirm observable variables or questions within the measurement model of the SUE, DBM, and FPF. Next, SEM was used to test the influence of SUE, DBM, and FPF. Model fit testing with empirical data was done by testing various statistical values according to the following criteria χ^2/df < 5.00 (Loo & Thorpe, 2000); RMSEA < 0.08; GFI > 0.90; CFI > 0.90; NFI > 0.90 (Hu & Bentler, 1999); IFI > 0.90; TLI > 0.90 (Hair *et al.*, 2014). The convergent validity analysis considering the question weights in each indicator's components had a statistical significance of 0.05 and a t-value > 1.96. This means the Lamda (λ) was different from 0, so it could be concluded that the gauge model showed convergent validity. The composite reliability or construct reliability (CR) > 0.7 (Carmines & Zeller, 1980); the average variance extracted (AVE) > 0.5 (Fornell & Larcker, 1981); the factor loading > 0.6 (Hair *et al.*, 2014); and discriminant validity analysis when comparing $\sqrt{AVE}$ of each variable with the correlation between the other variables, $\sqrt{AVE}$ must be higher than the correlation between the variables (Fornell & Larcker, 1981).

Path analysis aims to analyse the causal relationship between variables. Both magnitude and direction of influence were studied using path coefficient, total effect (TE); direct effect (DE); and indirect effect (IE) (Leech, Barrett, & Morgan, 2005).

RESULTS AND DISCUSSION

General Information on Start-ups in Thailand

According to 186 sampled start-ups in Thailand that answered the questionnaire in this research, it was found that most of the start-up's main industries were business service = 37.1%, followed by fintech = 12.9%, and industry tech = 9.1%. Most of the start-ups were in the series A growth phase (a phase of customer growth distribution where they start earning and have a clear business model) = 41.4%, followed by the seed funding growth phase (a phase of products/services development and improvement to meet the needs of the market as much as possible) = 36%, and the pre-seed growth phase (a phase of incubation that emphasises prototype product/service creation) = 10.8%. Most of the fundraising comes from venture capital = 24.7%, followed by corporate venture capital = 16.9%, and bank loan = 15%. Most of the fundraising valuations ranged from USD 2 to 15 million = 37.1%, followed by USD 15 to 30 million, and USD 10.05 thousand to 2 million. Most start-ups' time required to build their company from concept testing (pre-seed phase) to the present was less than 5 years = 54.8%, followed by 5–10 years = 42.5%. The total mean SUE was 5.47 with the SD = 1.307, meaning the start-up entrepreneurship was at a high level. Next, DBM had a total mean of 5.04 with the SD = 1.282, meaning the disruptive business model was at a high level, FPF had a total average of 5.53, and the SD = 1.106, meaning the firm performance was at a high level.

Constructs Development

Constructs development was conducted using EFA to find the optimal components of SUE, DBM, and FPF variables with common factor analysis using the principal axis factoring method which makes a root mean square residual (RMSR) low. This was suitable for factor analysis for SEM. Hair *et al.* (2014) suggested that oblique rotation is appropriate for small sample numbers and correlating factors are likely. According to the study, the components of the variables of the SUE, DBM, and FPF had a possibility of correlation, therefore oblique rotation with the Promax method was appropriate.

Start-up Entrepreneurship (SUE)

The EFA revealed that the KMO (Kaiser-Meyer-Olkin) = 0.881, meaning that the model was able to describe 88.10% of the SUE variables composition, which was at a good level. According to Barlett's test of sphericity, it was statistically significant at 0.01 level. The communalities were higher than 0.4 (Costello & Osborne, 2005). Furthermore, there was explainable cumulative variance by the components only if the eigenvalues > 1, representing 67.43%. Five SUE dimensions could be redeveloped. Moreover, CFA was consistent with empirical data. The index values were χ^2/df = 2.149; RMSEA = 0.045; GFI = 0.903; CFI = 0.985; NFI = 0.948; IFI = 0.985; and TLI = 0.980. According to the question, weights in each indicator's components had t-value > 1.96. Therefore, it could be concluded that the gauge model shows convergent validity. Meanwhile, CR, AVE, and factor loading had construct reliability. Thus, SUE could be measured with good reliability. Table 1 presents the details.

Observable variable or questions grouped into new five dimensions can define each dimension as follows:

Technology driven products/services development (TPD) refers to the design and development of a product/service that meets customer needs that change as technology advances. Devoting necessary resources and supporting ideas or research to develop new products/services could inspire, encourage, and motivate employees to improve their working methods with technology to seriously develop business innovations.

Innovative ideas (IDE) refer to supporting employees or creative development teams by brainstorming to present ideas, visions, and marketing strategies for new products/services as well as the search for new methods to do things that meet the needs of customers according to the advancement of technology.

Striving for venture (SFV) refers to the company's efforts to keep the entity to survive in a market with intense technological competition. It is to create an advantage over competitors using aggressive

competitive approaches with technology without giving up until entering the market with new products/services that the company can set a competitive price for.

Funding Network (FND) refers to the ability of the company to create a network to contact and exchange information with customers, partner companies, and partners to build confidence with the vision and plans for the new business where the company estimates the initial amount and working capital needed to start the business.

Initiation (INI) refers to investment in new products/services. Although the income and future growth is uncertain, companies are often the first to introduce new products/services, manage, or operate with new technologies.

Table 1. Results of SUE construct with reliability and validity

Dimension	Items	Factor loading	t-value	Sig.	R²	CR	AVE	Cronbach's Alpha
TPD						**0.937**	**0.682**	**0.935**
	SUE21	0.805	14.526	0.000***	0.649			
	SUE14	0.882	17.180	0.000***	0.778			
	SUE3	0.820	15.227	0.000***	0.673			
	SUE32	0.686	11.067	0.000***	0.470			
	SUE31	0.799	16.153	0.000***	0.639			
	SUE25	0.894	17.617	0.000***	0.799			
	SUE22	0.876	–	–	0.768			
IDE						**0.923**	**0.668**	**0.919**
	SUE33	0.808	12.865	0.000***	0.653			
	SUE2	0.899	15.136	0.000***	0.807			
	SUE20	0.856	14.145	0.000***	0.733			
	SUE7	0.713	10.608	0.000***	0.508			
	SUE1	0.810	12.903	0.000***	0.656			
	SUE19	0.806	–	–	0.649			
SFV						**0.842**	**0.646**	**0.827**
	SUE5	0.865	11.382	0.000***	0.748			
	SUE29	0.601	8.342	0.000***	0.355			
	SUE30	0.911	–	–	0.829			
FDN						**0.873**	**0.703**	**0.854**
	SUE6	0.603	9.377	0.000***	0.355			
	SUE9	0.884	18.226	0.000***	0.782			
	SUE8	0.982	–	–	0.965			
INI						**0.858**	**0.669**	**0.864**
	SUE26	0.817	11.751	0.000***	0.668			
	SUE24	0.839	12.026	0.000***	0.703			
	SUE23	0.797	–	–	0.634			

Note: TPD – technology driven product/service development, IDE – innovative idea, SFV – striving for venture, FND – funding network, INI – Initiation, ***p-value < 0.001.
Source: own study.

Disruptive Business Model (DBM)

The EFA revealed that the KMO = 0.878, meaning that the model was able to describe 87.80% of the DBM variable composition, which was at a good level. According to Barlett's test of sphericity, it was statistically significant at 0.01 level. The communalities values were greater than 0.4 (Costello & Osborne, 2005) and the cumulative explained variances was 78.63%. The three dimensions of the DBM could be redeveloped. Next, CFA was consistent with empirical data. Index values were χ^2/df = 1.978; RMSEA = 0.073; GFI = 0.945; CFI = 0.984; NFI = 0.969; IFI = 0.984; and TLI = 0.975. According to the question, weights in each indicator's components has t-value > 1.96, thus, it could be concluded that the gauge model shows convergent validity. Meanwhile CR, AVE, and factor loading had construct reliability. Thus, DBM could be measured with good reliability. Table 2 provides details.

Table 2. Results of DBM construct with reliability and validity

Dimension	Items	Factor loading	t-value	Sig.	R^2	CR	AVE	Cronbach's Alpha
BMG						0.932	0.819	0.931
	DBM1	0.893	19.575	0.000***	0.798			
	DBM5	0.888	19.565	0.000***	0.789			
	DBM4	0.934	–	–	0.872			
BMV						0.866	0.682	0.872
	DBM6	0.859	11.437	0.000***	0.737			
	DBM3	0.824	12.016	0.000***	0.679			
	DBM2	0.794	–	–	0.631			
TBM						0.930	0.815	0.929
	DBM9	0.868	17.903	0.000***	0.754			
	DBM8	0.909	21.002	0.000***	0.826			
	DBM7	0.930	–	–	0.865			

Note: BMG – business model generation, BMV – business model value, TBM – transformative business model, ***p-value < 0.001.
Source: own study.

Observable variables or questions grouped into new three dimensions can define each dimension as follows:

Business model generation (BMG) means using customer feedback as information to improve business models that meet market demand. It could start with new add-on services according to customer requirements which lead to the development of business models that meet the customer needs according to the advancement of technology.

Business model value (BMV) refers to a business model value that can solve problems and meet customer needs that change with the advancement of technology. Qualitative values such as the ability to solve customer problems and quantitative values such as price and speed of service could increase the cost of production that is not derived from the main product or service.

Transformative business model (TBM) refers to a trend of business model changes arising from the exchange of information about new products/services with both official and unofficial partners where the company's new products/services are interestingly seen as innovations that meet customer needs and can replace existing products/services.

Firm Performance (FPF)

The EFA revealed that the KMO = 0.825, meaning that the model was able to describe 82.50% of the FPF variable composition, which was at a good level. According to Barlett's test of sphericity, it was statistically significant at 0.01 level. The communalities value was greater than 0.4 (Costello & Osborne, 2005). Moreover, there was explainable cumulative variance by the components only if the eigenvalues > 1, representing 76.12%. The two new dimensions of the FPF could be redeveloped. Next, CFA was consistent with empirical data. The index value of χ^2/df = 2.084; RMSEA = 0.077; GFI = 0.971; CFI = 0.989; NFI = 0.980; IFI = 0.989; and TLI = 0.980. According to the question, weights in each indicator's components had t-value > 1.96, thus, it could be concluded that the gauge model showed convergent validity. Meanwhile, CR, AVE, and factor loading had construct reliability. Thus, FPF could be measured with good reliability. Table 3 provides details.

Observable variables or questions grouped into new two dimensions can define each dimension as follows:

Achievement (AMP) refers to the act of achieving goals according to the set objectives such as profitability, sales, etc. Achieving overall profit as specified in the business plan Including return on investment (ROI) that exceeds investors' expectations as stated in the company's business plan.

Relative profitability (RPP) refers to a comparison of competition with other companies on market share, the ability to grow sales, or net profit, etc.

Table 3. Results of FPF construct with reliability and validity

Dimension	Items	Factor loading	t-value	Sig.	R²	CR	AVE	Cronbach's Alpha
AMP						0.918	0.789	0.915
	FPF1	0.809	15.474	0.000***	0.655			
	FPF3	0.918	20.031	0.000***	0.843			
	FPF2	0.933	–	–	0.870			
RPP						0.887	0.724	0.883
	FPF4	0.780	12.217	0.000***	0.609			
	FPF6	0.935	14.997	0.000***	0.874			
	FPF5	0.830	–	–	0.689			

Note: AMP – achievement, RPP – relative profitability, ***p-value < 0.001
Source: own study.

<div align="center">

Structural Model

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Prior to analysing the SEM, to study the influence of SUE, DBM and FPF, each observed variable (Manifest) which refers to each question was reduced to composite variables by combining the values of each observed variable or each question of each component together then calculated the average value (Williams & O'Boyle, 2008). After reducing the observed variables or the questions of each component into composite variables, then using CFA, the measurement model, and the structural model were analysed. This process was recommended by Prajogo and Sohal (2003) and it aims to reduce the number of variables and parameters in SEM for a small sample.

Measurement Model

The results of the measurement model CFA analysis revealed that the index values were χ^2/df = 1.962; RMSEA = 0.072; GFI = 0.945; CFI = 0.975; NFI = 0.950; IFI = 0.975; and TLI = 0.959,thus indicating that the measurement model was consistent with the results of the tests of t-value > 1.96. Hence, it could be concluded that the gauge model shows convergent validity. Meanwhile, CR, AVE, and factor loading had composite reliability. Therefore, this measurement model could be measured with good reliability. Table 4 provides details.

Table 4. Results of measurement model with reliability and validity

Constructs	Composite Variables	Factor loading	t-value	Sig.	R²	CR	AVE	Cronbach's Alpha
SUE						0.874	0.585	0.923
	INI	0.698	10.037	0.000***	0.487			
	FDN	0.731	11.973	0.000***	0.534			
	SFV	0.704	11.315	0.000***	0.496			
	IDE	0.744	12.322	0.000***	0.554			
	TPD	0.924	–	–	0.854			
DBM						0.853	0.660	0.921
	TBM	0.824	11.539	0.000***	0.680			
	BMV	0.732	8.587	0.000***	0.535			
	BMG	0.875	–	–	0.765			
FPF						0.748	0.598	0.898
	RPP	0.717	8.450	0.000***	0.514			
	AMP	0.826	–	–	0.682			

Note: SUE – start-up entrepreneurship; TPD – technology-driven product/service development; IDE – innovative idea; SFV – striving for venture; FND – funding network; INI – Initiation, DBM – disruptive business model; BMG – business model generation; BMV – business model value; TBM – transformative business model, FPF – firm performance; AMP – achievement; RPP – relative profitability, ***p-value < 0.001
Source: own study.

Table 5. Results of discriminant validity

Constructs	CR	AVE	SUE	DBM	FPF
SUE	0.874	0.585	**0.765**	–	–
DBM	0.853	0.660	0.699	**0.812**	–
FPF	0.748	0.598	0.713	0.680	**0.773**

Source: own study.

Table 5 shows the discriminant validity, it was found that $\sqrt{AVE}$ of SUE = 0.765, DBM = 0.812, and FPF = 0.772 when comparing $\sqrt{AVE}$ of each variable along with the correlation between those variables and other variables in which $\sqrt{AVE}$ is higher than the correlation between the variables, which indicated that the measurement model had good discriminative consistency and could clearly distinguish each variable (Fornell & Larcker, 1981).

Structural Model

Figure 2 shows that SEM revealed that the index value of χ^2/df = 1.962; RMSEA = 0.072; GFI = 0.945; CFI = 0.975; NFI = 0.950; IFI = 0.975; and TLI = 0.959. This indicated that the structural equation modelling of SUE and DBM that influenced the FPF was consistent with the statistical criteria. This means that this structural model is valid.
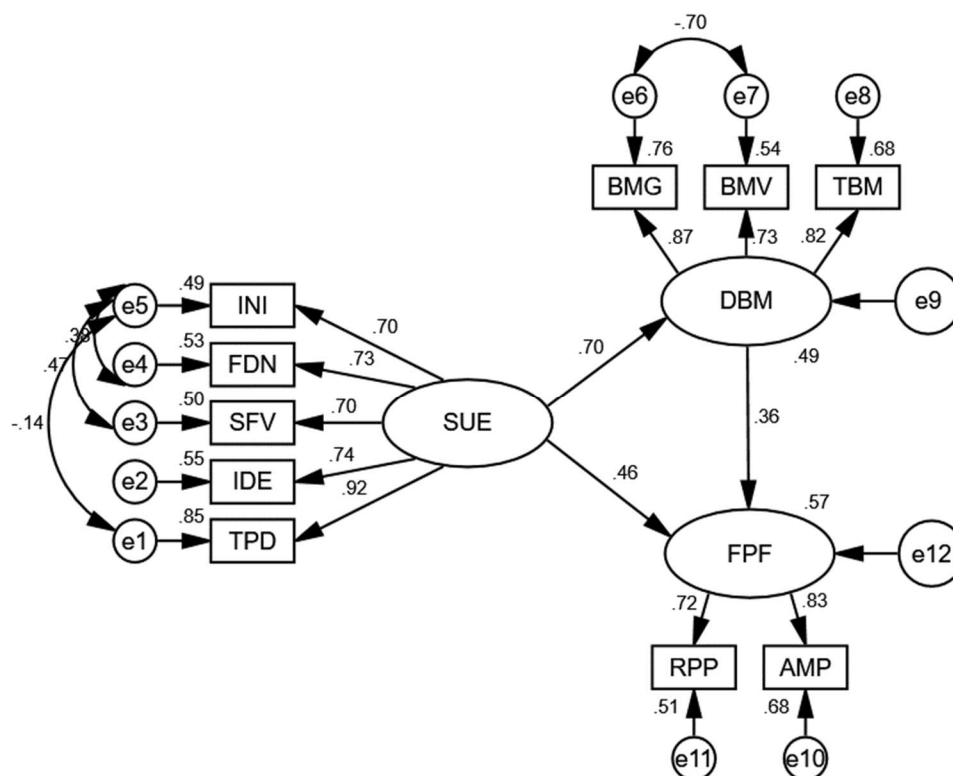
Figure 2. Structural model
Source: own elaboration.

Path Analysis

Table 6 shows that SUE had a positive direct effect on DBM. The path coefficient was very high (DE = 0.699, p < 0.001). When considering the indirect effect, it was found that SUE had no indirect effect on DBM. When considering the total effect, it was found that SUE had a total effect on DBM with a very high path coefficient (TE = 0.699, p < 0.001). The proportion of the variance could be explained and predicted with the coefficient of determination (R^2) = 0.488, meaning that 48.80% of the DBM variance could be explained and predicted by SUE, which is very high.

Table 6. Results of path coefficients of direct effects (DE); indirect effects (IE); and total effects (TE)

Dependent variables	Independent variables						R^2
	SUE			DBM			
	DE	IE	TE	DE	IE	TE	
DBM	0.699***		0.699***				0.488
FPF	0.464***	0.249***	0.713***	0.356**		0.356**	0.573

Note: **p-value < 0.01, ***p-value < 0.001.
Source: own study.

In the study, SUE had a positive direct effect on FPF. The path coefficient was high (DE = 0.464, p < 0.001). When considering the indirect effect, it was found that SUE had a positive indirect effect on FPF via DBM. The path coefficient was moderate (IE = 0.249, p < 0.001). When considering the total effect, it was found that SUE had a total effect on the FPF. The path coefficient was very high (TE = 0.713, p < 0.001). At the same time, DBM had a positive direct effect on FPF. The path coefficient was high (DE = 0.356, p < 0.01). When considering indirect effect, it was found that DBM had no indirect effect. When considering the total effect, it was found that DBM had a total effect on FPF with a path coefficient (TE = 0.356, p < 0.01). While the proportion of the variance could be explained and predicted with the coefficient of determination (R^2) = 0.573, meaning that 57.30% of the FPF variance could be explained and predicted by SUE and DBM, which were very high.

Discussion

The newly developed SUE dimensions are as follows: (1) technology-driven products/services development (TPD), (2) innovative ideas (IDE), (3) striving for venture (SFV), (4) funding Network (FND), (5) initiation (INI). The five new SUE dimensions can define SUE as the ability of potential entrepreneurs to change the competition with new innovative ideas; a new way to apply technology to business operations; initiation to design and develop a product/service that meets customers' needs according to the advancement of technology; the ability to create a funding network to contact and exchange information with customers, and partner companies; striving for venture without giving up until entering the market with newly develop products/services. It is consistent with Hyrkäs (2016) that SUE is the ability to adopt new information technology or new ways of using technology to do new things. A new joint venture with high earning potential has great potential to change the way of competition through innovation. However, in this research, SUE is the ability of a start-up that supports the concept of Rise (2011); Blank and Dorf (2012); SUE refers to people who see an opportunity to start a business and can make it grow by leaps and bounds by seeking for a revenue-generating business model which is profitably repeatable and scalable.

The dimensions of the newly developed DBM are as follows: (1) business model generation (BMG), (2) business model value (BMV), (3) transformative business model (TBM). The three new DBM dimensions can define that DMB is a process aiming to create a new business model and replace the existing business model, which occurs when an existing industry faces products/services that provide more value to customers than traditional business models to the point where they cannot compete directly. The trend of changing business models arises from receiving information about new products/services from customers and bringing many suggestions to solve problems, add value, and improve business models, which leads to the development of business models that meet the needs of new markets according to the needs of customers that change according to the advancement of technology. It is consistent with the ideas of Cavalcante *et al.* (2011); Sabatini, Cucculelli, and Gregori (2022). The DBM started with creating a new business model. It is important to discard or delete some processes and then close the old business-related section or unit, which is often attained by expanding new business models and adding activities or expanding new core processes to the existing business model. Expanding a new business model by improving existing business models through exploring new business alternatives. Followed by a gradual removal of processes associated with the existing business model and replacement of them with new processes for the new business model (Karimi & Walter, 2016).

Finally, the company ended its old business model by phasing out current processes and changing the existing business model with the new business model. Moreover, this supports the idea of Blank and Dorf (2012). The business model of a start-up arises from solutions meant to solve problems which leads to a valuable business model that can solve problems and meet customer needs.

The said developed dimensions of the FPF are as follows: (1) achievement (AMP), (2) relative profitability (RPP); both have financial and non-financial performance indicators which is consistent with Mapalala's concept (2017). The performance is the achievement of the ultimate goal. It can also be defined in terms of achieving the goal which is in line with the concept of Shan, Song, and Ju (2016). It focuses on the results of successful business operations which involves entering a new market, introducing new products/services to the market, and comparing profitability with other companies in order to formulate a strategy to create competitive advantages.

The hypothesis H1 was accepted, SUE had a positive direct effect on DBM at the 0.001 statistically significant level, with a very high path coefficient (DE = 0.699), and a standard coefficient (γ) = 0.699 (p < 0.001). The research findings support the idea of Blank and Dorf (2012). A start-up entrepreneur is a person who sees an opportunity to start a business and can make the business grow by leaps and bounds by searching for a profitable, repeatable and scalable business model which is in line with the findings of Karimi and Walter (2016). An outstanding attribute of entrepreneurs is the ability to deploy DBM effectively. Entrepreneurs can predict the extent of disruption in the business model beyond the company's original product and transaction characteristics. This makes start-up entrepreneurs have the ability to decide to develop a new business model that can replace the old business model. The results showed that SUE is in line with Schumpeter's (1991) idea of entrepreneurship acting as a mechanism of 'creative destruction' as an original concept before it was developed into a concept of 'disruption' (Christensen, 1997). Hence, SUE is a DBM development mechanism.

The hypothesis H2 was accepted, SUE had a positive direct effect on FPF at the 0.001 statistically significant level with a high path coefficient (DE = 0.464), and a standard coefficient (γ) = 0.464 (p < 0.001), supporting the findings of Shan, Song, and Ju (2016). Entrepreneurship is relevant to FPF through the speed of innovation which is consistent with the findings of Mapalala (2017). It was found that the relationship between entrepreneurship and organizational performance is in line with the ideas of Osiyevskyy and Dewald (2015). Entrepreneurs have the greatest effect on successful transformation in high-risk situations. Because of their risk tolerance and self-efficacy, the person is more prone to perceive opportunities. Entrepreneurs are strategic planners, exploiting threats for a competitive advantage.

The hypothesis H3 was accepted, DBM had a positive direct effect on FPF at 0.01 statistically significant level, with a high path coefficient (DE = 0.356), a standard coefficient (β) = 0.356 (p < 0.01). This finding is consistent with Osiyevskyy and Dewald (2015). The DBM innovation is related to other profitability and investment that are competitive in terms of the resources of the existing organization. Moreover, the research by Phangestu *et al*. (2020) found that financial metrics are key performance appraisals of a company that could indicate the success of a company, the success of leadership roles of the entrepreneurs, and the success of the company's DBM. This supports Sonthiprasat's concept (2014). Thus, DBM can develop new products/services that provide a competitive advantage and can improve company profits.

CONCLUSIONS

The dimensions of the newly developed SUE, DBM, and FPF meet the first research objective that develops the constructs of SUE, DBM, and FPF. These new dimensions could be developed dynamically, which contributed that SUE acting as the engine of DBM development. Thus, the new dimensions could be used to develop start-ups. To begin with, the new business model generation, technology-driven products/services development to meet the customer needs and seeking investors network. The second research objective was to study the causal relationship between SUE, DBM, and FPF and it was found that SUE and DBM had a positive influence on FPF, while SUE had a positive influence on DBM as well. Hence, the impact of DBM will be strengthened, and impacting FPF can gain a competitive advantage and improve

profitability as start-ups introduce a new business model with technological innovation that will redefine industries and restructure the economy (Schumpeter, 1991; Adler *et al.*, 2019).

Start-up entrepreneurs enhance perception skills, combat threat awareness and risks in their industry, and seek opportunities in disruption. It shows a positive impact on the new business model that will replace the old one with strategic planning starting from looking for problems that arise from threats, accepting and strengthening the old business model or deciding to develop a new business model. Therefore, start-ups should seek new customer bases. This is because a new or improved business model could exceed the needs of existing mainstream customers. It could take some time to switch to products/services developed from DBM (Osiyevskyy & Dewald, 2015). For example, DBM in the photography, film, and publishing business is being replaced by digital technology, e-media, and streaming, and the emerging travel business with travel agencies is being replaced by the online format of websites or apps for accommodation reservations, travel, and site visits on your own (e-brokering) or even virtual tours. Although, this research found that most of the start-ups were in the A growth phase (a phase of customer growth distribution where they start earning and have a clear business model) = 41.4%, the fundraising valuations ranged from USD 2 to 15 million = 37.1%, and FPF had a high level (mean = 5.53), while SUE and DBM had a positive influence on FPF with the impact being high. However, funded start-ups are likely to disappear after five years. Most start-ups survive on investment, with three out of four failing to return their investment (Gage, 2012; Cantamessa *et al.*, 2018; Aminova & Marchi 2021), and rather might also be viewed as a temporary organization (Blank, 2020). Start-ups should focus on measuring FPF by setting clear goals for success and regularly monitoring and controlling operational strategies that can lead to the intended outcomes. After the success of the proposed business model which means it has been accepted, its product/service has been profitable, the business could be acquired by a large corporation or could enter the stock market through an IPO (initial public offering). Therefore, an FPF measurement clearly demonstrates results in terms of profitability and competitiveness over competitors and strengthens confidence amongst investors very well (Sonthiprasat, 2014).

The limitation of the research is that some start-ups could not provide information due to investor contracts, and some were uncomfortable providing numerical financial information and a financial metric is a factor of start-up success as well as the income and investment received (Phangestu *et al.*, 2020). However, numerical results alone may not adequately describe the system of performance appraisals. Consequently, this research developed performance measurement to determine and compare the level of achievement of firm objectives (Yang, 2012). Future research should be applied the new dimensions of SUE and DMB to study and develop start-ups in the industries that tend to grow well from technological advances and are consistent with the country's economic development policy such as agri tech, health tech, property tech and urban tech, and travel tech, etc. Mixed methods with qualitative and quantitative would be required.

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Appendix: Table scale items

Start-up entrepreneurship (McGee *et al*., 2009; Karimi & Walter, 2016; Mapalala, 2017; Shan, Song, & Ju, 2016)
Searching
SUE1:   The company can brainstorm new ideas for new products/services.
SUE2:   The company can identify the need for new products/services.
SUE3:   The company can design new products/services that meet the needs of customers.
Planning
SUE4:   The company estimates customer demand for new products/services.
SUE5:   The company sets competitive prices for new products/services.
SUE6:   The company estimates the initial amount and working capital needed to start the business.
SUE7:   The company designs effective marketing strategies for new products/services.

Marshaling
SUE8:   The company can build confidence in the vision and plans for new business with customers, partners and partners.
SUE9:   The company's network is capable of communicating and exchanging information with customers, business partners, and partners.
SUE10: The company's business concept is clear, guiding employees to operate every day.

Implementation
SUE11: The company has the ability to supervise employees.
SUE12: The company has the ability to recruit and hire employees.
SUE13: The company has the ability to delegate tasks and responsibilities to employees.
SUE14: The company has the ability to inspire, encourage, and motivate employees.
SUE15: The company has the ability to train employees.
SUE16: The company has the ability to organize and maintain financial interests.
SUE17: The company has the ability to manage financial assets.
SUE18: The company has the ability to read and interpret financial statements.

Innovativeness
SUE19: The company is creative in operation.
SUE20: The company seeks new approaches to operate things.
SUE21: The company attentively improves and develops business innovations.

Pro-activeness
SUE22: The company develops products/services based on customer needs arising from technological advancements.
SUE23: The company is often the first in the country to introduce new technology products/services.
SUE24: The company is often the first in the country to offer management or operation by means of technology.

Risk-taking
SUE25: The company supports the idea or research results to develop new products/services in technology.
SUE26: The company is willing to invest in new products/services although the revenue and future growth is uncertain.
SUE27: The company manages business risk with new technologies.

Competitive aggressiveness
SUE28: The company's business environment is highly competitive with technology.
SUE29: The company takes a competitive approach using technology to gain an edge over competitors.
SUE30: The company is trying its best to survive in a market with strong technology competitiveness.

Autonomy

SUE31: The company encourages its employees to create and motivate change in the way they work with technology.

SUE32: The company is dedicated to using the resources necessary for the development of technology products/services.

SUE33: The company encourages employees or teams to present ideas, visions, and implementation using technology.

Disruptive business model (Osiyevskyy & Dewald, 2015; Sonthiprasat, 2014; Karimi & Walter, 2016)

DBM1: The company adds value with new value-added services to meet market demand.

DBM2: The cost of production that is not derived from the core products/services is comparatively higher.

DBM3: The company offers fee discounts to meet market demand.

DBM4: The company takes customer feedback as information to meet market needs.

DBM5: The company will change its business model to add value to its customers.

DBM6: Over the past 1–3 years, the company has introduced value within its products/services that change according to customer needs.

DBM7: Over the past 1–3 years, companies have exchanged information about new products/services with both official and unofficial partners

DBM8: Over the past 1–3 years, the company's new products have gained attention as innovative solutions to meet customer needs.

DBM9: Over the past 1–3 years, the company has introduced new products/services that can replace the existing products/services.

Firm performance (Shan, Song, & Ju, 2016)

FPF1: Return on investment (ROI) exceeds investor expectations as stated in the company's business plan.

FPF2: The company achieves all established goals and objectives of this new business (*e.g.*, profitability, sales, etc.).

FPF3: The company succeeds by its overall profitability (*e.g.*, as stated in the business plan).

FPF4: When compared to the competition, the company has the ability to grow sales at the level of (1=greatly not growing, 7=greatly growing).

FPF5: When compared in terms of competition, the company has a market share at the level of (1=no significant market share, 7=extreme market share).

FPF6: When compared in terms of competition, the company has a net profit of (1=extremely profitable, 7=extremely profitable).

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Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.