



Article

The Dynamics of Micro and Small Enterprises (MSE) toward Bankability with Coronavirus Pandemic Adjustment

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Abstract: The objective of this study is to elaborate on the development of micro and small enterprises (MSEs) at the bottom of the economy, where most of them began as unbanked micro-ventures and may continue to be micro-enterprises even after being elevated to higher levels. This study contributes to the field of entrepreneurial finance by identifying the factors that influence the drivers and constraints of MSE upgrading. This paper employed models to show how unbanked MSEs transition to bankable ones, as well as to reveal the dynamics of MSEs' transition to bankability during the COVID-19 pandemic. This study's unit of analysis is MSEs, which initially have little or no access to bank loans. This study employs system dynamics (SD) modeling to investigate and manage the multifaceted response system of MSEs' growth toward bankability in the face of a coronavirus pandemic in Indonesia. This study also simulates a coronavirus pandemic outbreak to fine-tune MSEs' progress toward bankability. The dynamic models in this study reveal a number of variables that are critical in accelerating the bankability status of MSE from un-bankable to bankable, namely entrepreneurial MSE time to bankability, channel business, and MSE NPL. Policymakers can create high leverage policies for MSE bankability progression by changing these values.



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1. Introduction

For many years, the advancement of micro and small enterprises (MSEs) has been an intriguing research topic. Some researchers referred to it as the growth stage [1–3], evolution [4,5], upgrading [6–8], mobility [9], and many other terms. These studies recognize that enterprise growth is dependent not only on internal management, but also on external forces. While MSEs have been praised for their resilience in previous financial crises, the latest coronavirus attack demonstrates how MSE life and growth have been crushed [10,11].

Since Indonesia is the world's fourth most populous country, it is expected to suffer greatly and over a longer time period from COVID-19. Indonesia reported no cases of infection from December 2019 to February 2020, until President Joko Widodo reported the first confirmed case of COVID-19 infection in Indonesia on 2 March 2020 [12]. On 18 September 2020, there were 232,628 positive cases in Indonesia, with a date rate of 9,222 people [13]. The COVID-19 pandemic has caused global society shock because many factories around the world have been shut down, causing many employees to lose their jobs.

The Indonesian government has implemented health protocols and lockdowns to monitor the situation and prevent disease spread. As a result, the supply of goods/services decreases because the demand for those goods/services decreases. Lockdowns in several countries and industry slowdowns (for example, hospitality and travel) are expected to intensify unemployment conditions in the coming months [14]. This condition also affects micro and small enterprises (MSEs), such as small shop owners and household businesses run by family members, the majority of which are unreported. Many MSEs are also experiencing significant difficulties as a consequence of the lockdown [15].

Scholars and other institutions are concerned about the survival and development of MSEs because the ups and downs of small businesses have a significant impact not only on businesses but also on the nation's economy and social welfare (see, for example, Obi [16]). In this situation, it is important to establish the stage of development of a small business; however, it is even more critical to identify the bankability characteristics at each stage and how we can approach problems differently at each stage. Coad and Tamvada [17], as well as Reeg [6], have identified the factors that influence the drivers and constraints of the MSE upgrade. In terms of financing, Prijadi et al. [9] discovered that there are many layers of problems for micro-enterprises before they can access external financing to enable them to expand from micro-sized to larger enterprises.

The purpose of this study is to discover more about dynamics of unbanked MSEs' mobility toward bankability. This study offers three new aspects to the field of entrepreneurial finance research. To begin, this study identifies the primary factors that allow unbanked micro-enterprises to become bankable. The central episode of this study is their progress toward bankability, as MSEs must decide whether to continue with their stable operations on this path. Second, this study employs an appropriate simulated model to explain how MSEs' mobility toward bankability has shifted in the face of external shocks like the COVID-19 pandemic. Finally, this study looks at government interventions that would increase the likelihood of MSEs progressing to higher levels. R&D intervention that leads to innovation could be the best option.

This study's unit of analysis is MSEs, which initially have little or no access to bank loans. The core episode of this research is their progress toward bankability, as the MSEs will decide whether or not to proceed with their stable operations on this path. Furthermore, system dynamic (SD) modeling was used in this study to obtain a more precise explanation of the complexity of MSEs' progress toward bankability. A system dynamics approach can better represent MSE mobility (when they grow and progress to higher levels, or when they are immovable or stagnant in their position). Given the importance of the government's role, this study incorporates the government's position into the model to predict whether the intervention will accelerate the movement of MSEs toward bankability. This study also simulates a coronavirus pandemic attack to adjust the progress of MSEs toward bankability.

Following the introductory remarks, Section 2 presents a literature review to re-examine the financing issues confronting MSEs in their early stages. Section 3 defines the critical stages of MSEs' bankability. Section 4 depicts how MSEs progress from ideation to start-up and ongoing business phases using an SD approach. This section would also demonstrate how the coronavirus pandemic will endanger MSEs and evaluate the model's validity. Section 5 portrays the bankability stages, which will concentrate on the financing side as the primary driver of MSE growth prior to the use of bank loans. Section 6 discusses the simulation results from several scenario analyses, which allowed the government to experiment with policies. Finally, Section 7 concludes the findings and provides future research recommendations.

2. Financing Issues during Early Stage of MSEs

Previous research indicates that the majority of entrepreneurs rely on internal funds, such as personal savings, as their primary sources of startup capital [18–20]. Others seek external funds, mainly from business partners or development agencies, such as private or government organizations [18,19]. Financial institutions are rarely used because many start-ups are unable to fulfill the requirements when applying for loans from banks or financial institutions [21].

Angel investors, corporate venture capital (VC), hybrid organizational forms, government agencies, and banks may provide external finance to early-stage MSEs [22–24]. Obviously, different sources of funds assess risks differently before considering providing capital or loans to startups. Numerous studies have found that angel investors, private agencies, and hybrid organizational forms are more involved in seed funding and start-up for MSEs with limited financing needs [25,26].

MSEs require the most funding during their early life cycle, when the internal fund is insufficient. As a result, financial support from outside sources is critical. Obtaining external funds from banks, on the other hand, may not be an option for MSEs in their early stages, as most of them operate solely on a cash basis [5]. The percentage of those with bank access is still small [18] and is not typical of such MSEs at this stage. Several studies show that tough financial service requirements are the major failure causes for MSEs' ability to be bankable [18,27–31]. If MSEs have the ability to innovate, they can overcome issues with obtaining external funding [32,33]. As a result, innovation is not only important for assisting MSEs in overcoming the barriers to obtaining external funding, but it is also considered necessary for MSEs to advance to higher levels.

Another reason why most MSEs operate solely on cash is that people have access to banking transactions or other financial services but opt not to use them [34,35]. This is referred to as voluntary exclusion. This could be due to personal reasons, such as cultural or religious differences [34,36], which entail a different approach. Another issue arises when financial services are not directed towards the targeted segment of society, namely people at the bottom of the pyramid (BOP) [26,35–38]. While this is referred to as involuntary exclusion, micro-finance institutions suffer as a result of reduced access to banking and financial services. Involuntary exclusion occurs as a result of financial services being denied due to insufficient income, discrimination, information bias, a lack of proper knowledge, and the high cost of product offerings in financial and banking services [34,36,39].

Involuntary exclusion may be a barrier to successful financial inclusion for MSEs on their path to bankability [36]. According to practices and research, financial exclusion is also caused by demand side factors, such as not having a bank account [36,40]. The persistent gaps in the delivery systems for supporting income-generating activities for the poor necessitate the revival of a developmental financing approach in which financial services are just one important component integrated with other services using newer technologies, rather than just delivering financial services on a standalone basis [38]. However, there is a growing emphasis on inclusive growth these days. Banking's reach and coverage area, as well as its technology, have advanced quickly enough, and, more importantly, the realization that the poor are bankable has arrived [34].

Facilitating access to financial banking and services supports the nation in stimulating entrepreneurship and business creation [41]. Credit should support real sector activity that is linked to livelihoods and income generation for the poor for efforts toward greater financial inclusion to be meaningful. When an entrepreneur establishes an MSE, he or she typically uses internal sources of finance from the owners, friends, relatives, and/or suppliers [2,21,26,42–44]. As they expand, their primary sources of financing shift to banks and new partners rather than internal financing such as retained earnings [2,24,26,42–44]. Access to financial resources such as banking services will potentially be very important for MSEs seeking to grow and become bankable [43].

3. Defining MSEs Critical Stages toward Bankability

Several authors assessed stages for micro, small, and medium enterprises (MSME) in different ways. Churchill [1] categorizes MSMEs into five stages from existence, survival, success–disengagements, success–growth, and take-off to maturity. He defines and characterizes each stage from their management style, organization structure, and business ownership. Sceilovs, Shatreovich, and Gaile-Sarkane [45] define MSMEs' growth into three stages: start-up, scale-up, and scaler stage. They differentiate the stage by looking at MSMEs' market access, revenues, and number of employees. Meanwhile, noticing the evolution of MSMEs' network, Schutjens and Stam [4] partitioned the stages into entrepreneurial, business start-up, and ongoing phases. Prijadi and Desiana [46] and Prijadi et al. [9] classified MSME in Indonesia into three stages, namely entrepreneurial, start-up, and on-going business. They defined the stages from its financing issues and adopted the stages from Churchill [1]. This research focused on micro and small business enterprises (MSEs) in Indonesia and adopted the latter view due to its simplicity and

appropriateness to examine the financing issue faced by MSEs in their early evolution to bankability. Thus, this research adapted the study from Prijadi et al. [9], research that had done previously in Indonesia and had categorized MSE based on their bankability. We assumed that the MSEs progress toward bankability through two stages, namely, entrepreneurial and startup MSE. Note that the MSEs might move from one stage to higher ones, remain on the same stage for some time, or die [47].

A brief description of each stage is as follows. The entrepreneurial stage—identical to Churchill's first and second stages combined—is a period where the owner performs all business duties and initiates a network with all stakeholders [1]. Major sources of finance at this stage are capital from the owners, families, friends, relatives, and suppliers, anything but formal financial institutions [19,20,42]. Survival is the only strategy at this stage. To do so, the enterprise has to exploit its relationships with customers and suppliers. The key problem at this stage occurs when the firm is unable to manage revenues against expenses and gaining capital to support their existence [1]. Those who cannot handle this might face bankruptcy and go out of business. Many others remain in the entrepreneurial stage.

In the entrepreneurial stage, some of the firms become bigger in size, capital, and profit, which allow them to move to the startup stage. As they grow and move to the startup stage, the sources of funds—which initially come from the firms' surplus, capital from owners, and their relatives—are expanded to other financial sources, including banks and new partners [2,43]. However, the proportion of funding from formal financial institutions is still limited. With wider financing supports, they have more stable and profitable business at this stage. Their major strategies are either maintaining a profitable status-quo or adding more capital as a necessity for growing [1]. However, if they cannot manage the external financing wisely or fail to maintain their operations efficiently, their firms might return to the early entrepreneurial stage or even leave the business. Once the firms become bigger and financially healthier they can progress to the higher stage, characterized by growth strategy. This higher stage is no longer MSEs and will not be further analyzed.

Roles of Government

There are a substantial number of micro and poor entrepreneurs in Indonesia who badly need financing, but instead do not have adequate access to affordable funds. Bihari [34] mentioned that the absences of technology, reach, and coverage, and inefficiency of delivery mechanism, were the major reasons. The issue of government intervention to overcome the failure of financial inclusion has also been the focus of a large volume of literature [5,19,21,24,26,30,34,40,42,48,49]. Indeed, the lowest income group faces more complex problems of credit rationing, despite the fact that microcredit programs are designed to target households at the BOP [50]. In the specific case of Indonesia, there is also the issue of minimum participation of borrowers in Indonesia's formal financial institutions. The percentage of accounts at formal financial institutions of customers with an age higher than 15 years old was only 36% of the total population in 2014 (20% in 2011). Meanwhile, loans from the financial institutions of customers with an age higher than 15 years old comprised only 13% of the total population in 2014 (9% in 2011) [51]. Many of the borrowers preferred to borrow from other channels, such as from friends and relatives (around 41% in 2014). These data suggest that many of the people at the BOP are categorized as non-bankable, as they prefer to borrow from informal sources than formal sources. The issue of credit not being channeled or accessible to the targeted people at BOP will inhibit the growth of MSEs if they are not quickly addressed.

As Hyytinen and Takalo [41] mention, easing access to financial banking and services help nations to stimulate entrepreneurship and business creation. Financing at the entrepreneurial stage determines whether a business idea can be realized. To keep the business idea flourishing, the government is obliged to guarantee a firms' creation experiencing less obstacles. Indeed, the roles of government are essential, even though the intervention must be carefully designed. To facilitate entrepreneurial MSEs to progress to the higher stages, government is urged to create innovative financing policies and systematic policy

formulation to support entrepreneurial development [18,42,47,48] or, in general ways, to review their corporate law [41]. The government could lighten up the regulation of MSEs financing, supply the network of industry collaboration, and provide direct funding to the entrepreneurs. These ways have proven successful in bridging the entrepreneurial MSEs to the market [22,41,42,48,52]. The convenience of financing policy outlined by the government to enable MSE to obtain funds from external sources will undoubtedly aid MSE in the short run. However, it will not necessarily ensure the sustainability of MSEs' external funding. As an alternative, the government might facilitate R&D initiatives intended to foster innovation among MSEs. If this pattern of R&D activities is in line with the needs and can be adopted by MSE, this strategy is likely to have a more sustained impact [33,53].

Regarding COVID-19, the government issued several policies and implementing action plans to prevent the spread of COVID-19 outbreak. This restriction has had more severe effects on MSEs, and they need to explore more opportunities to survive (including using digital) [14]. Governments around the world have several actions in place to solve these problems—the government of European Union Countries provides support to help companies with providing emergency support to MSEs through cash grants in order to meet liquidity needs [54]. Several countries give free electricity, waiver/reduction of electricity bills, VAT exemptions on electricity bills, some cost reductions on solar lamps, and relief funds for renewable energy companies [55]. The stimulus package from Indonesia for MSEs is as follows:

- a. Interest subsidy
- b. Tax subsidy
- c. Grant for MSEs

4. The SD Model Development of MSEs Stages

SD modelling is used in this research to identify the complex relationship of the MSEs bankability stages and explore several scenarios. SD was introduced by Jay Forrester in his book, *Industrial Dynamics*, in the early 1960s [56,57]. The SD model and methodology have been applied by various researchers [4,58–62] in different problem situations. They were used to develop causal loop diagrams, flow diagrams, and the governing equations/situations. In fact, they have been used to address practically every sort of feedback system, problem solving, and policy design. SD methodology requires the business analyst to view a complete system of relationships whereby the “cause” might also be affected by the “effect” [63]. SD allows entrepreneurs and decision-makers to link strategy to action and to understand the crucial role of strategic resources on firm performance and survival [64]. The purpose of SD modeling here is to improve our understanding of the ways in which MSE evolve and move from one stage to another stage to approach a bankability status. Therefore, the model is expected to give an insight into designing high leverage policies for MSE bankability's advance.

We used both qualitative and quantitative research to gain detailed information regarding the key aspects and variables of how MSE evolve in term of bankability. Facts were generated from respondent experiences and observations. Fraenkel and Wallen [65] stated that qualitative research is a study that requires researchers to study the phenomenon that occurred naturally with all its complexity. By conducting qualitative research, this study aims to find out interesting aspects that cannot be achieved through a quantitative research approach [66]. Meanwhile, the quantitative designs in this research are used as a means to explore the respondents' understanding and their behavior toward MSE involvement toward bankability. Both research designs were deemed to portray a clear phenomenon of what drives MSE to be able to adopt and evolve to a better stage. Thus, this approach was appropriate for this study, as the researcher intended to collect detailed information through descriptions and was useful for identifying variables and hypothetical constructs to map the model.

The data obtained were primary and secondary data. Malhotra [67] explains that primary data are data generated to meet the needs of research conducted. Meanwhile,

secondary data are data collected to supplement research or additional data that can be obtained from books, literature studies, related articles from problems or newspapers, on-line journals, website about research objects, and other library discussions [67]. In this research, we obtained the primary data from in-depth interviews (Table 1). The duration required in each interview activity is approximately 2.5 h and produces 3000 to 5000 words. In conducting interviews, the researcher needed a list of questions to make the interview work according to the purpose of the research.

Table 1. Respondent sample distribution.

Sample Distribution	East Java	Lombok	Bandung	Makassar	Medan	Total
MSE	4	4	2	2	2	14
MSE's Association and Bank	3	2	5	1	1	12
Government	1	1	1	1	1	5
Total	8	7	8	4	4	31

Source: Author's data.

This research emphasized the quadruple-helix involvement of ABCG [68], namely Academics (academics observing MSEs), Business (MSE business representatives), Community (MSE Community/Association), and Government. Each of the actors (quadruples) had different characteristics and perspectives on understanding the growth of bankability evolvement of MSEs. The academics here were in the form of the literature review. Since we observed the evolvement of MSE bankability, we also interviewed bank representatives as community actors. There are 31 actors involved in this research study, distributed throughout Indonesia. The details of respondents are shown in Table 1 below:

The MSE vary in size, but they had all operated for a minimum of two years before 2018. Financing range also varied from Rp 300,000 to Rp 600,000,000, but on average, financing was under Rp 10,000,000. The sources of financing come from savings, own assets or borrowing from family or banks. Several MSEs have additional sources of financing, namely from cooperatives, social ministry grants, and government agencies. Most of the MSE were unbankable. One of the reasons for this is that they feel insecure and that it is hard to borrow from banks. Therefore, it is more comfortable to have a financial credit for other options. This city was chosen as a big city in Indonesia.

Creswell et al. [69] asserted that the entire population may not be easy to study. In this research, the MSE model from sample designated was built to obtain the MSE stages SD model. As mentioned, we assume that the MSEs progress toward bankability through two stages, namely, entrepreneurial and startup MSE (Figure 1). The growth rate moved each of the enterprises to the next stage, while the dead rate of MSE captured the unsurvived MSE whether they died or went bankrupt, and thus moved away from their stage. The initial input parameters for the MSE stages model were gained from MSE data that were gained by interviewing the respondent.

The coronavirus pandemic acted as a shock in this model. MSEs problems were more difficult than those of big companies as a result of demand for goods and services having decreased. They were unable to pay salaries and keep commitments to suppliers. Several MSEs are temporarily closed and several are permanently closed as a result of lockdown [70]. The survey from LIPI on the performance of MSE during the COVID-19 pandemic [71] collected perceptions of business actors regarding the vulnerability of MSEs to close businesses if the pandemic did not end soon. As many as 47.13% of businesses were only able to survive until August 2020, 72.02% of businesses were closed after November 2020, and 85.42% of businesses could survive the longest, within one year since the pandemic. We put this in the death rate of entrepreneurial and start-up MSE that increased 70% in the first semester of 2020. MSE will eventually be all gone if they stand idle and wait for a helping hand from the government. Since the government has stimulated the survival of these MSE, there is an additional growth rate of these MSE with the effects of this pandemic. We named it as a government intervention to entrepreneurial

MSE for 50%/year and 0.03% to start-up MSE that started in the middle of 2020. Moreover, MSEs also need to find innovative ways to overcome this pandemic. The new normal means that MSEs must be innovative and implement the health protocols. New pandemics are almost certainly inevitable, thus households and business will and must take steps to reduce their exposure to this kind of disruption. This is quantified by adding an innovation rate for each MSE stage. The innovation rate for entrepreneurial MSE is 15%/year and 0.05% for start-up MSE. The numbers for start-up MSE are lower, as startup MSEs can adapt to pandemics faster than entrepreneurial MSE. This rate will eventually bring the number of MSE to increase with a slower rate and adapt to the new normal with the coronavirus pandemic.

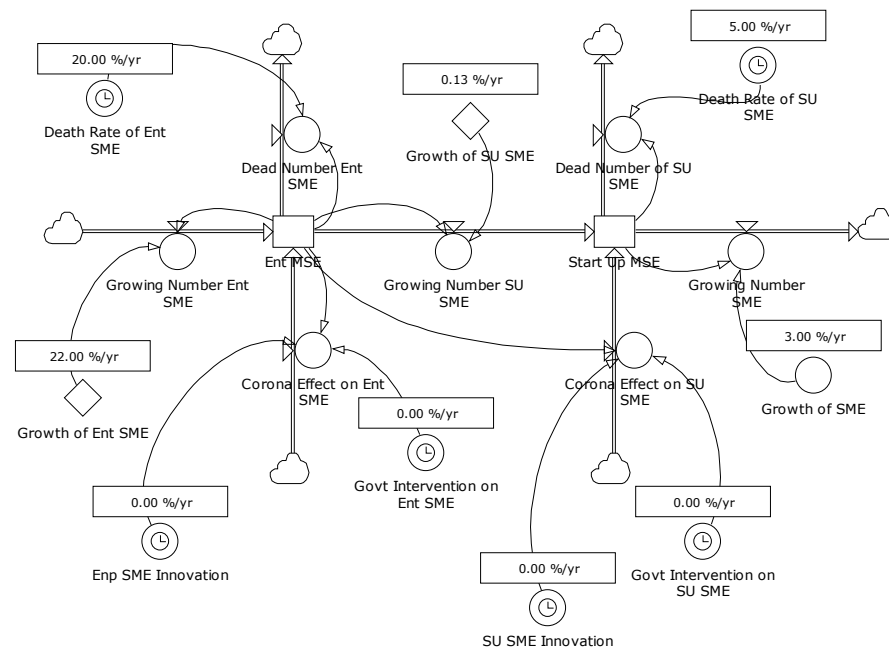


Figure 1. The MSE stages and simulation results.

Table 2 shows the initial input parameters for the MSE Stages Model. The overall initial input data was gained from MSE data in 2013, mostly from the results of interviewing the respondent.

Table 2. Parameter input for the MSE stages model.

Parameter	Definition	Unit	Initial Data
Growth Rate of Ent MSE	Number of Percentage Growth Rate of Entrepreneurial MSE	Percentage per year	22%/yr
Death Rate of Ent MSE	Number of Percentage Death Rate of Entrepreneurial MSE	Percentage per year	20%/yr
Entrepreneurial MSE	Number of Entrepreneurial MSE	MSE (in million)	57,189
Growth Rate of SU MSE	Number of Percentage Growth Rate of Start-Up MSE	Percentage per year	0.13%/yr
Growth Rate MSE	Number of Percentage Growth Rate of MSE	Percentage per year	3%/yr
Death Rate of SU MSE	Number of Percentage Death Rate of Start-Up MSE	Percentage per year	5%/yr
Start-Up MSE	Number of Start-Up MSE	MSE (in million)	654

Model Validation

In simulation modeling, several validation tests must be undertaken [72]. There are several tests that can be done to validate the system dynamics model proposed by Barlas [73]. To ensure the dimensional consistency, the software Powersim 10 that we used carried out the units check function. For the behavior reproduction test, the behavior

pattern test (or the reference mode behavior test) was carried out. The micro-enterprises (entrepreneurial MSE) and small enterprises (start-up MSE) are selected, where historical data are available. We set the simulation for validity testing for seven years from 2013 to 2019. Figure 2 visualizes the fit between simulated series and historical data for micro-enterprises and small enterprises. As can be seen, the model has been found to be satisfactory to track the historical time series data.

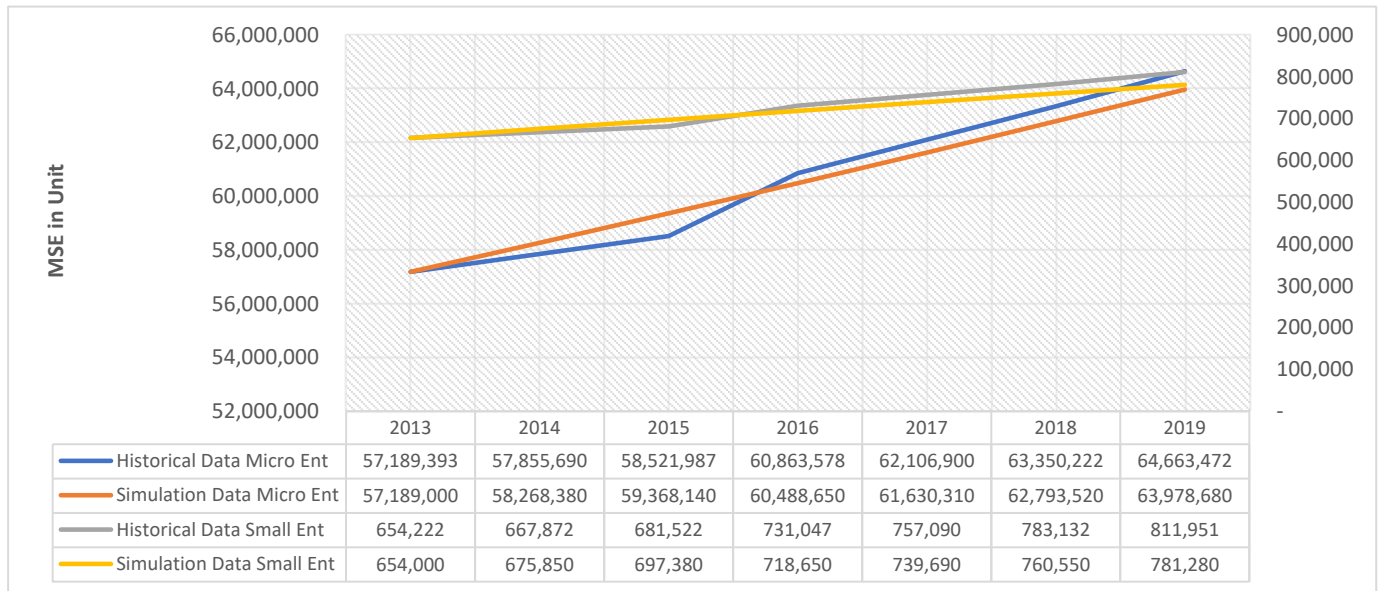


Figure 2. Comparison between historical and simulation Data.

From a statistics view, we used both Error Rate ($E1$) and Amplitude Variations Comparisons ($E2$) from Barlas [73] to check whether the conceptual model of simulation was an accurate representation of the real system. It can be calculated as follows:

$$E1 = \frac{(\mu S - \mu A)}{\mu A}$$

$$E2 = \frac{(\alpha S - \alpha A)}{\alpha A}$$

where,

μS = Mean of simulation data

μA = Mean of real data

αS = Standard deviation of simulation data

αA = Standard deviation of real data

Since the model is considered valid if $E1 \leq 5\%$ and $E2 \leq 30\%$ [73], the model in this research is valid since it fits the data relatively well (Table 3) and may go for further analysis. The amplitude variations (variance errors) of micro-enterprises and small enterprises are:

Table 3. Model validation measures.

		MEAN	STD DEV.	E1	E2
MICRO ENTERPRISE	Historical Data	59,743,954	2,460,320	0.11%	12.27%
	Simulation Data	59,677,122	51,616		
SMALL ENTERPRISE	Historical Data	707,283	2,158,461	0.75%	20.47%
	Simulation Data	701,972	41,049		

5. The MSEs Bankability Stages

The MSE SD model in this research replicated the S-shaped growth model, as can be seen in Figure 3 with a popular simple stock and flow diagram (SFD) model of infectious disease or epidemic SI (susceptible and infectious) model [72]. The total population of the community represented in the model is divided into two categories: those susceptible to the disease, and those who are infectious. The model employs chronic infections where people remain infectious indefinitely once they are infected. It has two loops, one positive loop and one negative loop. The infectious diseases transmit their disease to those who are not infected yet and pass it to those who are susceptible. Thus, we added the infectious population as an effect of the positive loop (R), while at the same time depleting the susceptible population as an effect of the negative loop (B). As can be expected, the result is S-shaped growth for infectious populations, where the total population is assumed to be constant at 500 people.

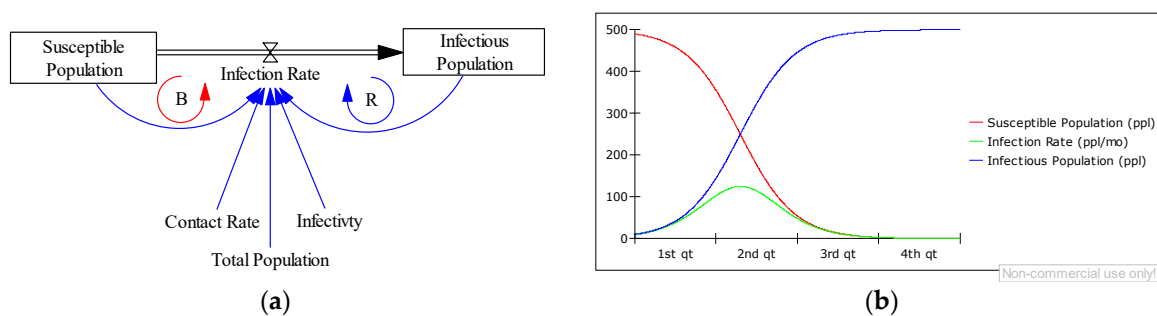


Figure 3. The infectious disease SD model of (a) SFD and (b) its S-shaped behavior.

Figures 4 and 5 captured the model of MSE bankability evolvement. Figure 4 represent simplified MSE's bankability stage for entrepreneurial MSE, and Figure 5 shows the start-up stage. To see the evolvement of bankability for each stage, we divided each stage into either unbankable or bankable, which is depicted in Figure 6. We used the model that has been adapted to the coronavirus pandemic. As mentioned before, the input data gained the result of interviewing the respondent.

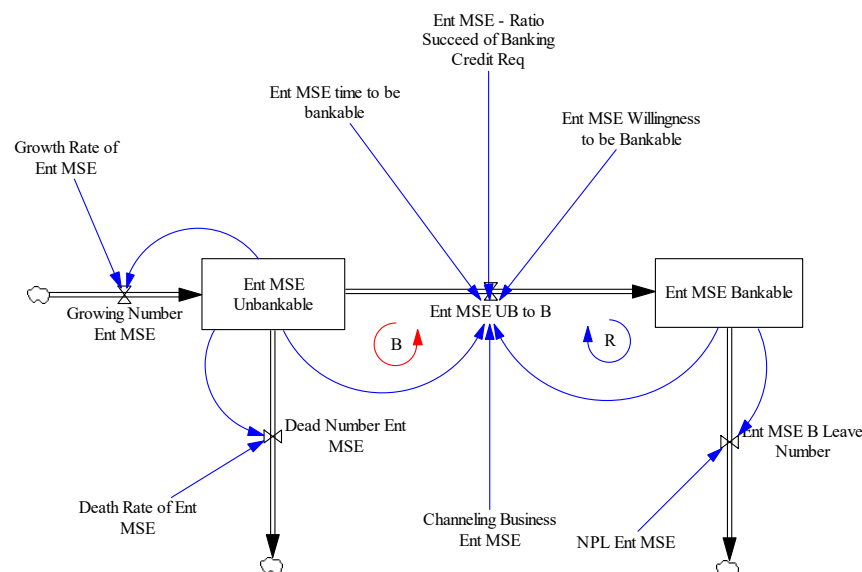


Figure 4. Entrepreneurial MSE to bankability SD model.

Figure 6 displays the full SFD model of MSE toward its bankability. The MSE stages, from entrepreneurial to start-up, are reflected in the left hand-side “MSE Stages” model and in the base model in Figure 1. Then, the “MSE Bankability Stages” are reflected in the

right hand-side as a portion of their shipments from being unbankable to be bankable. The “MSE Bankability Stages” is a coflow structure that is used to keep track of the attributes and variables in the base model (MSE Stages) as they travel through the stock and flow structure of the system. The number of Entrepreneurial Unbankable MSE was a portion of all unit of Entrepreneurial MSE for 45%, while the number of start-up Unbankable MSE accounted for 20% of all units of start-up MSE. The growth and death rate for each stage of MSE have the same value as in the base model (Figure 1). Table 4 refers to the initial input and parameter unit for each variable in the model.

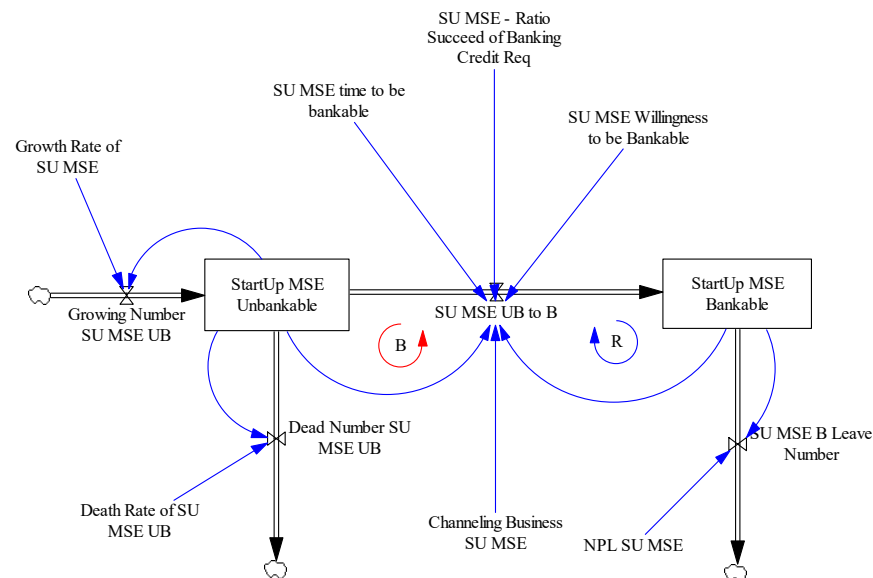


Figure 5. Start-up MSE to bankability SD model.

Table 4. Parameters’ input for the entrepreneurial and start-up MSE bankability stages model.

Parameter	Definition	Unit	Initial Data
Ent MSE Unbankable	Number of Entrepreneurial MSE Unbankable	MSE (in million)	Ent MSE × Percentage Unbankable Ent MSE
Ent MSE time to be Bankable	Time needed for Entrepreneurial MSE to be bankable	Year	20 yr
Ent MSE Ratio Succeed of Banking Requirement	Succeed Rate of Entrepreneurial MSE of Banking Requirements	Percentage	5%
Ent MSE Willingness to be Bankable	Percentage Rate of Entrepreneurial MSE who wants to be Bankable	Percentage	0.60%
Channeling Business (Ent and SU MSE)	Effect of having Business Channels to bring MSE to be Bankable	Percentage	20%
NPL (Ent and SU) MSE	Non-Performing Loan Rate of MSE on banking loan	Percentage per year	5%/yr
Ent MSE Bankable	Number of Entrepreneurial MSE Bankable	MSE (in million)	Ent MSE × (1 – Percentage Unbankable Ent MSE)
Start-Up MSE Unbankable	Number of Start-Up MSE Unbankable	MSE (in million)	SU MSE × Percentage Unbankable SU MSE
SU MSE time to be Bankable	Time needed for Start-Up MSE to be bankable	Year	5 yr
SU MSE Ratio Succeed of Banking Requirement	Succeed Rate of Start-Up MSE of Banking Requirements	Percentage	20%
SU MSE Willingness to be Bankable	Percentage Rate of Start-Up MSE who wants to be Bankable	Percentage	1%
Start-Up MSE Bankable	Number of Start-Up MSE Bankable	MSE (in million)	SU MSE × (1 – Percentage Unbankable SU MSE)

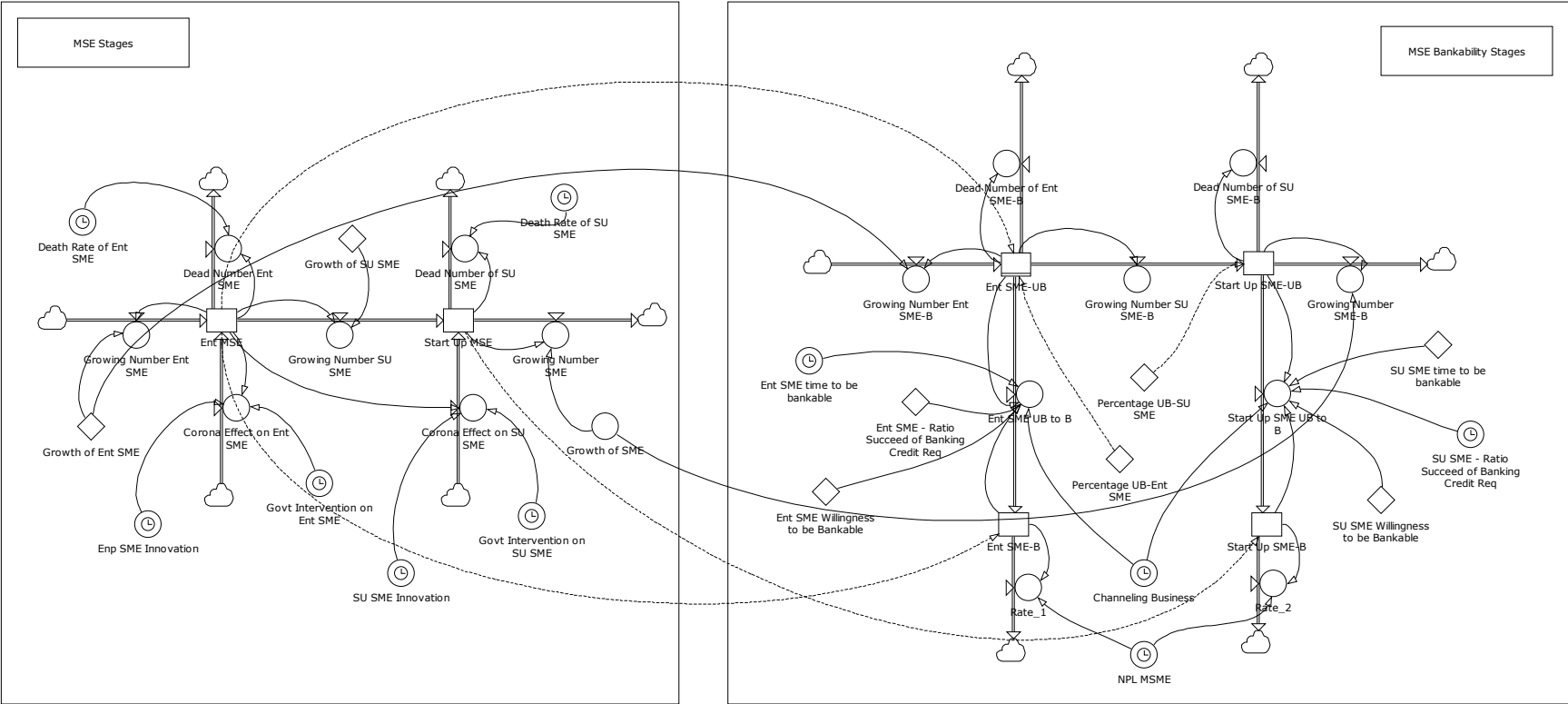


Figure 6. The MSE to bankability SD model.

6. Result and Discussion

We set the simulation period from 2017 to 2030 (twelve years). The unit of simulation was in units of MSE. The time step for simulation was four days. The graph results are shown in Figures 7 and 8 below, and show the unbankable micro-scale (entrepreneurial MSE) up to bankable entrepreneurial MSE, and small (start-up MSE) scale up to bankable start-up MSE. These graphs reveal, as expected, that the number of either unbankable entrepreneurial or start-up MSE will move to the bankability stage as expected. These graphs also show an S-shaped graph with a shock from coronavirus pandemic. The S-shaped graph models were used as a variety of important model, namely for applications to the diffusion of innovations, the growth of the market for new products, and many others [72]. In this research, the model relaxed the assumptions of the popular infectious disease SD model. The most restrictive and unrealistic feature of the infectious disease model is the assumption that the disease is chronic, with affected individuals remaining infectious indefinitely. It also does not represent births, deaths, or migration. Meanwhile, our model has the growth rate and death rate, and the small (or start-up) enterprises can go further to level-up stages.

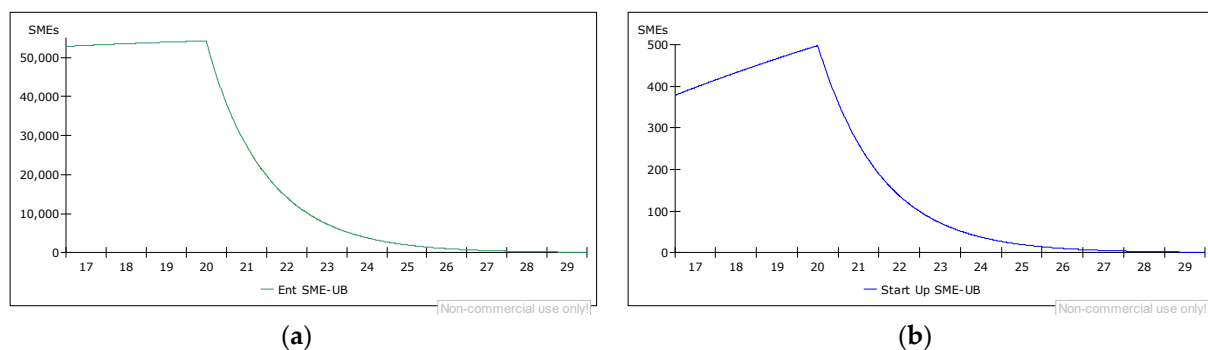


Figure 7. Simulation graph of (a) unbankable entrepreneurial MSE and (b) unbankable start-up MSE.

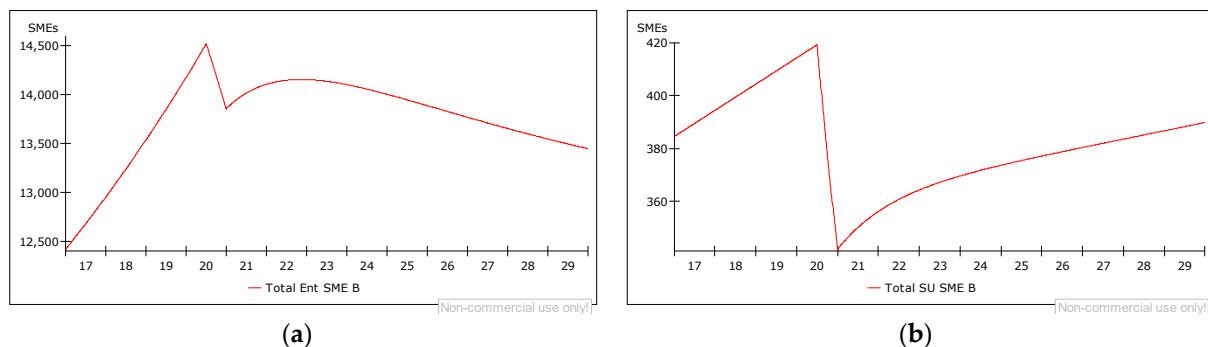


Figure 8. Simulation graph of (a) bankable entrepreneurial MSE and (b) bankable start-up MSE.

At first, the dominance of positive loop made the unbankable MSE bankable (Figure 7a,b). Afterwards, a nonlinear transition shifted from dominance of positive feedback to dominance of negative feedback loop and diminished the unit of unbankable MSE. Meanwhile, the total unit of bankable MSE (Figure 8a,b) also started with the positive feedback loop that creates exponential growth for bankable MSE. Since no real quantity can grow forever, and given the limits to a growth approach, a nonlinear transition moved from dominance of positive feedback to dominance of negative feedback loop. Both models represented the accumulation of MSE unit and the S-shaped behavior. However, the bankable entrepreneurial MSE shows a decreasing pattern that was the result of the balancing loop of its NPL rate, while it does not greatly affect the bankable start-up MSE (Figure 8a,b). Table 5 presents the simulation data for each of the MSE units.

Table 5. Simulation data of unbankable and bankable entrepreneurial and start-up MSE.

Time	Ent SME-UB	Total Ent SME B	Start Up SME-UB	Total SU SME B
1-Jan-17	52,790.10	12,421.20	378.50	384.56
1-Jan-18	53,260.11	12,954.69	415.49	394.51
1-Jan-19	53,673.08	13,537.82	450.17	404.45
1-Jan-20	53,019.64	14,176.39	482.64	414.39
1-Jan-21	38,206.68	13,860.52	361.09	341.79
1-Jan-22	19,779.85	14,106.44	189.25	356.12
1-Jan-23	10,238.35	14,155.08	99.03	364.25
1-Jan-24	5300.92	14,102.97	51.75	369.56
1-Jan-25	2745.89	14,044.77	27.01	373.62
1-Jan-26	1423.19	13,889.15	14.09	377.11
1-Jan-27	738.09	13,770.48	7.34	380.37
1-Jan-28	383.01	13,665.69	3.82	383.55
1-Jan-29	198.87	13,548.02	1.99	386.71
1-Jan-30	103.32	13,448.83	1.04	389.88

The SD models above allow us to better understand the dynamics underlying the complex of MSE stages to reach bankability status with a shock of coronavirus pandemic based on several stages. It can be seen that MSEs have limited ability to counterattack the risk of the pandemic due to slow down of business activities. With a helping hand from the government, the MSE will move to be bankable in the future. However, this model may help decision-makers in evaluating alternative strategies to advance MSE's evolvement in their bankability status. As in a flight simulator, the decision-maker has the possibility to simulate the effect of their strategies with reference to the levers or variables that they can modify in the long term.

In this research, we will focus on variables that drive MSE from unbankable to being bankable, namely (1) entrepreneurial MSE time to be bankable, (2) start-up MSE ratio succeed of banking credit requirements, (3) channel business, and (4) NPL of MSE. Four scenarios will be performed where these variables were set higher or lower than the current values after four years of simulation, which started in the year 2021 as a consequence of the pandemic. It was done in order to check the consequences on the end results and on the sensitivity of variables to the evolvement of MSE bankability over time. The scenarios are the following:

- Scenario 1: Ent. MSE time to be bankable = 10 years;
- Scenario 2: Start-up MSE ratio succeed of banking credit requirements = 40%;
- Scenario 3: Channel Business = 40%;
- Scenario 4: NPL of MSE = 3%.

In scenario simulation 1 (Figure 9), we changed the entrepreneurial MSE time to be bankable from 20 years to 10 years. We found that it was necessary to start reducing the voluntary exclusion so that MSEs would no longer operate on a cash basis only and start to use banking services. Moreover, we also found in our observation results that some entrepreneurial MSEs expected to be able to speed up their bankability status. The result of this time reduction shows that this would increase the number of bankability status of entrepreneurial MSE. There is no significant change of the bankability status of start-up MSE, since the majority of bankable MSE are on the stock of bankable entrepreneurial MSE. In the base simulation, the unit of the entrepreneurial MSE at the end of simulation period year 2030 is 13.448 thousand units, and kept decreasing (Table 5) due to its balancing loop of the NPL rate. In our first scenario, the unit of the entrepreneurial MSE had already

reached the number of 14.101 thousand units in 2030, exceeding the base scenario (Figure 9). Figures 9–12 represent the results of the four scenario simulations, including the data for entrepreneurial and start-up MSE in unit. The star symbol (*) and the blue line indicate the base simulation.

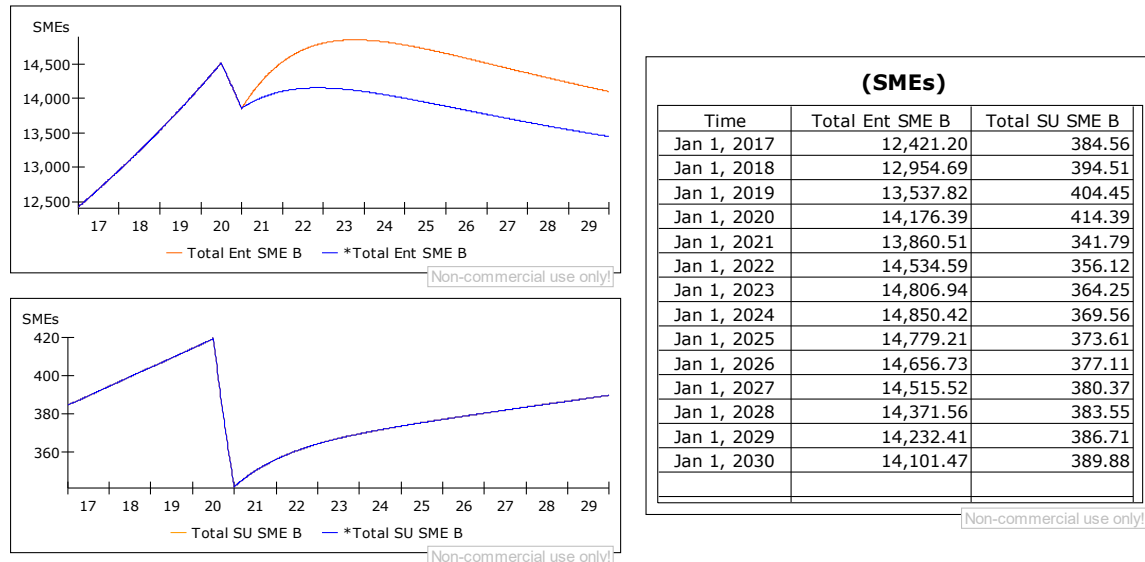


Figure 9. Simulation result of Scenario 1.

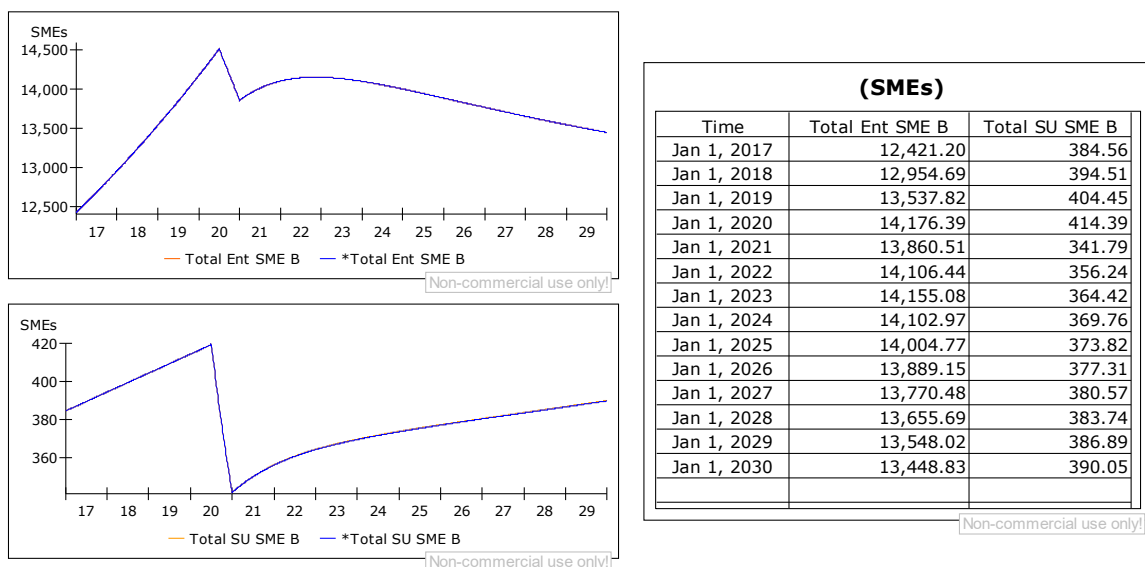


Figure 10. Simulation result of Scenario 2.

In scenario simulation 2 (Figure 10), we set the start-up MSE ratio succeed of banking credit requirements to be doubled from 20% to 40%. We change it since there is a high expectancy for start-up MSE to be able to fulfill the banking credit requirements with less effort, rather than for entrepreneurial MSE. We did not change the ratio of entrepreneurial ratio succeed of banking credit requirements since it will definitely take more time and effort to help them to fulfill all the necessary documents of banking credit requirements. As we can see from the figure above, there is no significant change for both bankable entrepreneurial and start-up MSE. The reinforcing loop works a bit faster to bring the unbankable start-up MSE to be bankable. In this scenario, the unit of bankable start-up MSE is a bit higher in 2030, which is 390 thousand units compared to the base simulation.

Figure 11 depicts the result of scenario simulation 3, where the variable of channel business is doubled from 20% to 40% for all stages of MSE. We increased this effect since

our observation indicated that channel business or networking is very crucial to help MSEs to notice the financial services advantages, as well as to bring MSE to be closer to their stakeholders so that it causes the unbankable MSE to be bankable sooner. We expect that increasing this value will bring unbankable MSE to be bankable sooner. The result in Figure 11 shows, as expected, that the scenario result succeeded in bringing the unbankable entrepreneurial to be bankable faster than the base simulation. Meanwhile, there is no significant effect to start-up MSE, since almost all the unbankable start-up MSE reached almost zero units.

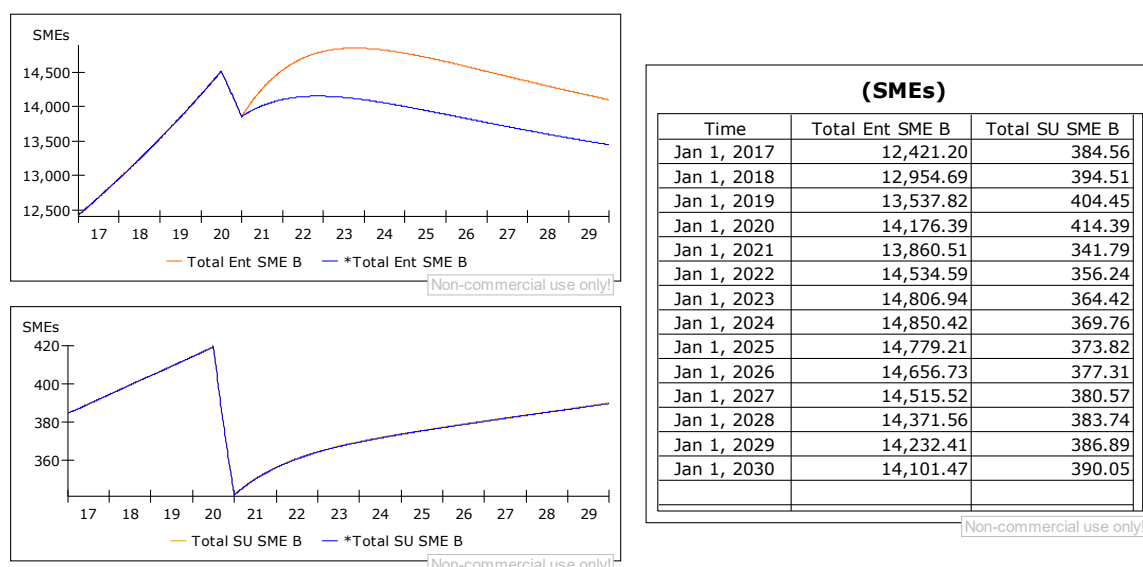


Figure 11. Simulation result of Scenario 3.

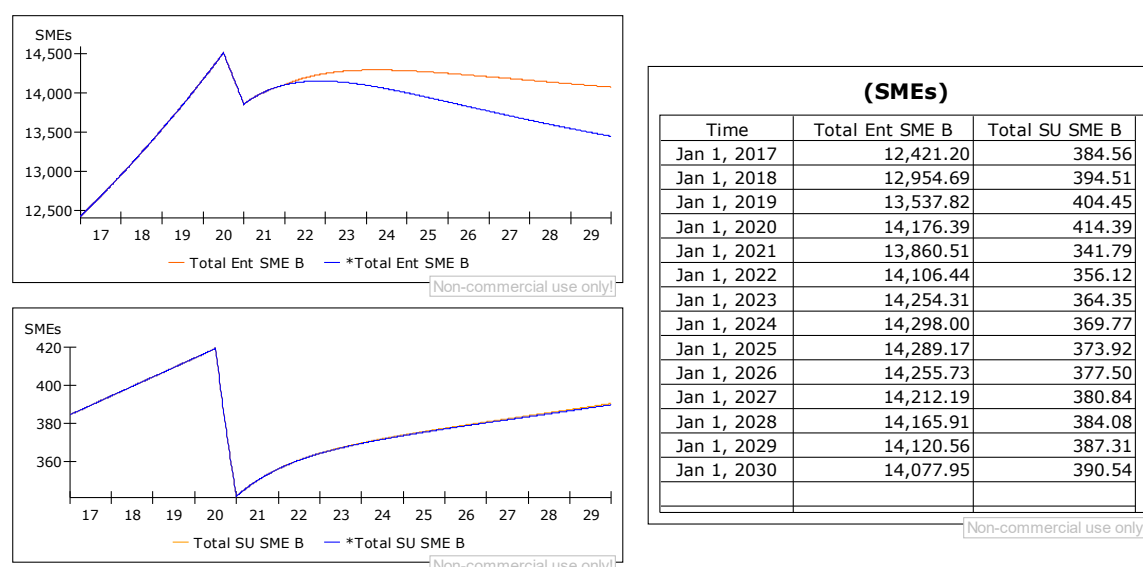


Figure 12. Simulation result of Scenario 4.

The scenario simulation 4 is displayed in Figure 12, where the non-performing loan (NPL) of MSE is set to be lower as much as 3% rather than the actual value of 5%. This value is the same for both entrepreneurial and start-up MSE. Based on our observation, banks had high expectancy that the NPL of MSE, which could be lower than the target value, so that the bankable MSE remains on its bankability status. By decreasing the NPL rate, the balancing loop of leave number from bankable MSE is expected to be lower. As can be seen in the results in Figure 12, the lower NPL makes the number of entrepreneurial

bankable MSE slightly higher than the base simulation. Meanwhile, there is no significant effect to start-up MSE, since almost all the unbankable start-up MSE has reached almost zero units.

From all the scenario simulations, we noticed that the change in all variables had a significant effect on MSE bankability. The analysis of the model and scenario, however, leads to the identification of some areas of potential improvement:

- Increasing the estimated time for entrepreneurial MSE to be bankable is able to bring unbankable MSE to be bankable faster than the current condition;
- Increasing the start-up MSE ratio succeed of banking credit is not giving a significant effect to bring unbankable MSE to be bankable;
- Increasing the effect of business channel for MSE is able to bring unbankable MSE to be bankable faster than the current condition;
- Decreasing the NPL of MSE is able to bring unbankable MSE to be bankable faster than the current condition.

Finally, Figure 13 shows the result when we combined scenario 1, 3, and 4 into one simulation. We can see that these scenarios can lead to a faster movement of each MSE from being unbankable to bankable. In 2030, the unit of the entrepreneurial MSE in the end of simulation period year 2030 is 16,590 thousand, exceeding the base scenario (Figure 9). Scenarios 1, 3, and 4, however, had considerable impacts in bringing the MSE from unbankable to being bankable. This could mean that focusing on managing these three variables performance at the same time, with the intent of maximizing the value of the estimated time for entrepreneurial MSE to be bankable and the effect of business channel for MSE, could be more challenging but will give higher rewards to execute MSE bankability evolvement. This research tries to give a more sobering picture of the coronavirus outbreak for MSE bankability stages that goes beyond official statistics. The same research in Iran [74] simulated an SD model of the early spread of COVID-19 had tested model's capability from projecting confirmed cases and confirmed its model to have predictive power. Therefore, these results are suggested to be qualitatively reliable. However, managing each of the scenarios from this research is not an easy task. Sometimes, it can create a conflict and, as a result, the need to effectively manage the related trade-offs with a methodological support based on a systemic view of the nation is required. All stakeholders must support this goal to make it a sustainable change.

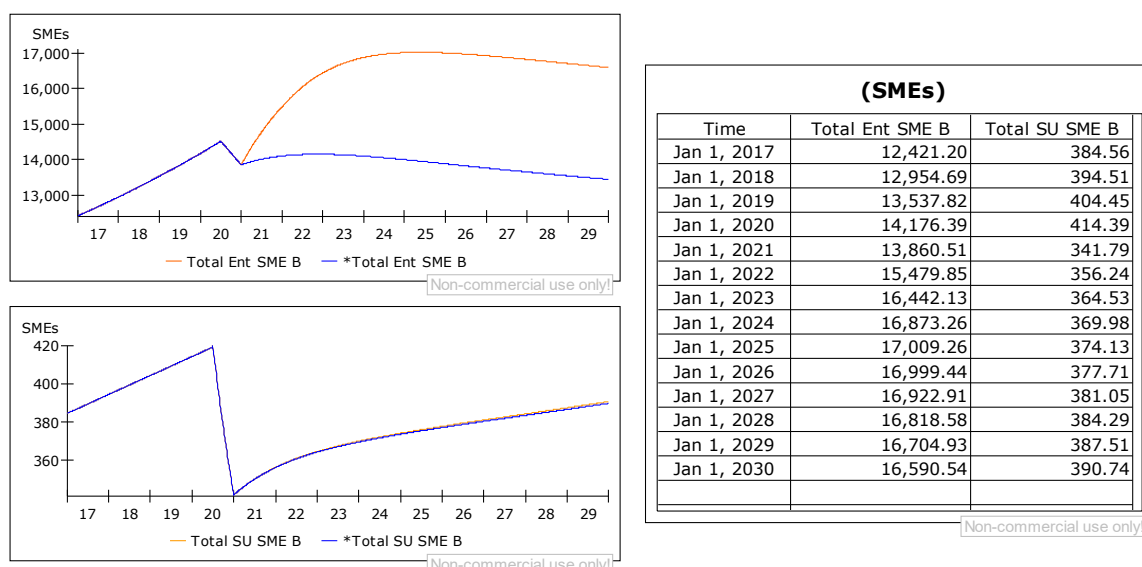


Figure 13. Simulation result of Scenario 1, 3, and 4.

7. Conclusions and Future Research

7.1. Conclusions

This study explored the important findings of the dynamic complexity of MSE bankability evolution using modeling and simulation-based methodologies to better support MSE entrepreneurs in their bankability performance, with some coronavirus pandemic adjustment. This study chose SD modeling because numerous studies have demonstrated its utility in analyzing feedback systems, problem solving, and policy design. Our goal is to gain a better understanding of how MSEs evolve towards bankability in a coronavirus pandemic situation. Following simulation, the model reveals several variables that are critical in moving MSE's status from unbankable to bankable. They are entrepreneurial MSEs in the phase of becoming bankable, networks, and MSEs' NPLs. Policymakers can create high leverage policies for MSE bankability advancement by changing these values. The adopted model has also shown the government's modest involvement in encouraging MSE innovation, which may be used to improve access to external funding, which is essential to the upgrading process.

7.2. Managerial Implication

MSEs must be self-sufficient nowadays (not depend so much on government grant). MSEs must build reliable procedures and maintain a dependable technical staff to ensure the efficient operation of their businesses (especially when using digital platforms). After COVID-19, MSEs must prepare for a crisis scenario and a contingency plan. By establishing numerous specialized networks, the bankability of MSEs has been enhanced. MSEs will be increasingly integrated into society at all levels as a result [14]. Future MSE employees will be protected, and the economy, income, and job security will improve [15].

7.3. Limitations and Future Research

This study's proposed model focuses on generalizing the advancement of MSEs toward bankability in Indonesia. This study simplifies the model to capture the dynamics of micro and small business development using only a few factors, namely time to be bankable, willingness to be bankable, channeling factors, and ratio success of banking requirements. This study's applied modeling has limitations because not all components or subsystems were mapped, which would require a large amount of data and considerable work. As a result, comprehension of the uncertain system or subsystems is limited. As a result, it may be worthwhile conducting additional research that incorporates other factors, such as export strategy, owner proactivity, or social and business network. Other factors may also be worth investigating. Furthermore, due to the differences in each country's situation, this research is only applicable to Indonesia. However, this model already provides a useful framework for regulatory decisions regarding MSE upgrading to bankability.

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