

Sustainable Competitive Advantage in the Manufacturing Firms: The Effects of Planning Flexibility and Entrepreneurship with Business Environment as a Moderating Variable

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Abstract— This study aims to investigate the effects of planning flexibility and entrepreneurship moderated by the business environment on sustainable competitive advantage in manufacturing firms. Data were collected through questionnaires spread through manufacturing firms in South Sumatera, Indonesia and the Central Bureau of Statistics. A total of 308 responses were analyzed through Structural Equation Modelling (SEM) approach using the statistical package AMOS 22.0. The results evidence that, before moderated by business environment, planning flexibility does not affect sustainable competitive advantage, whereas entrepreneurship affects sustainable competitive advantage. After moderated by the business environment, both planning flexibility and entrepreneurship affect sustainable competitive advantage.

Keywords: *planning flexibility, entrepreneurship, sustainable competitive advantage, manufacturing, Industry 4.0*

I. INTRODUCTION

The world is in the era of globalization, liberalization [1], and industrial revolution 4.0 [2]–[5]. Changes and developments in this period have caused tighter competition among companies in the world. Specifically for manufacturing firms, to win the game, they must focus on the location of the company, the intensity of competition, and changes in customer expectations [6]. These factors require companies to possess a competitive advantage [7].

When a company has a competitive advantage, this indicates the company has superior resources and better business performance compared to its competitors [8] has a product that has economic value and a higher level of profit than its competitors [9] has established position in the market [10]. On the other hand, when a company possesses a sustainable competitive advantage, this means the company is capable of enhancing its revenue and creating corporate values in the long-term [11].

There are three sources of sustainable competitive advantage (SCA). They are marketing advantage, cost

advantage [12], and distinctive competencies [13]. Marketing advantage refers to a product's superiority in the form of brand; quality and value of the product or service that suits the needs and desires of consumers; product differentiation and customer-centricity [10] as well as value creation [14]. Cost advantage is a firm's capability to reduce production and/or marketing costs that will result in a better price offered relative to competitors. In short, the advantage is in the form of cost leadership [10]. The last SCA resource is distinctive competencies. They are in the forms of workforce expertise and resource excellence [9] company assets, information, and knowledge [15]–[17] organizational capabilities [18] competencies [19]–[22] valuable, unique, and irreplaceable resources [23]–[25] company reputation [26] and long-term isolation mechanisms in the industry [27]. The three SCA sources are key strategies for the company in dealing with a dynamic and complex business environment.

In this era of disruption, environment complexity is a natural condition encountered by any industry. To cope with this challenge, company leaders must implement advanced entrepreneurship and planning flexibility strategy. Researchers agree that combining these two aspects is beneficial to improve company performance [28]–[30]. Therefore, it is necessary to conduct further research on the interaction between entrepreneurship and planning flexibility in an increasingly uncertain business environment.

Regarding entrepreneurship, it corresponds to innovation and networks [31]. In Industry 4.0, due to the holistic digitalization of manufacturing process, development and innovation periods need to be shortened [32]. High entrepreneurial capability in the form of innovation is a substantial success factor for many manufacturing firms [33]–[35]. Further, in the networking context [36] stated that in the value creation modules, company-internal intelligent and external actors are cross-linking. This implies that a firm's capability in managing its networks, internally and externally, affects its competitive advantage. These further

emphasize the need to study the effect of entrepreneurship on sustainable competitive advantage in the manufacturing industry. Lastly, planning flexibility has been more crucial in Industry 4.0. In this era, products can be individualized and customized according to buyers' specifications [32]. This new framework requires higher flexibility in product development, especially in production [32]. Without this capability, a firm will unlikely to acquire a sustainable competitive advantage. Hence, to empirically evidence this assumption, a study on the effect of planning flexibility on sustainable competitive advantage is needed.

Based on the aforementioned discussion, this study formulates the research problem as follows: how do entrepreneurship and planning flexibility moderated by business environment affect sustainable competitive advantage in manufacturing firms? This research offers three contributions. First, it extends the Industry 4.0 literature regarding factors that influence sustainable competitive advantage. Second, it provides insight for manufacturing firms on the importance of entrepreneurship and planning flexibility to enhance their sustainable competitive advantage. Third, this research can be beneficial for local governments as a basis for developing regional economic development policies through strengthening manufacturing industry by encouraging innovation, expanding business networks, and directing companies to be more flexible in preparing their business plans.

II. LITERATURE REVIEW

A. Entrepreneurship

An entrepreneur is a creative innovator [37]. Meanwhile, characterized an entrepreneur as an individual who can maximize opportunities [38]. Broaden the concept of entrepreneurship as an organization's tendency to engage in innovative, risk-taking, and proactive strategies [39], [40]. As the knowledge and practice of entrepreneurship development, entrepreneurship then is defined as the process of creating value through the identification and exploitation of opportunities such as developing new products or finding new markets or both [41]–[44]. Innovation is one of the significant factors in gaining a competitive advantage in this era of a more globalized economy [45] [46]

Apart from innovation, business network expansion can also enhance competitive advantage [47]. In today's business environment, individuals and companies aspire to be more compatible and interactive with their networks [48]. This is more verifiable when each of the business partners believes that their relationship encourages better performance [27]. Such networks involve relationships with customers, suppliers, and competitors among others [49] and often exceed the limits - industrial, geographical, political, and cultural boundaries. In Industry 4.0, networks are becoming increasingly important for all types of companies [50], because they can give them access to information, resources, markets, and even sometimes, technology [51].

B. Planning Flexibility

Strategic management relates to the overall direction and vision of the company implemented by management through a combination of resources with the aim of building capabilities in a particular environment [52]. In their study, implemented five dimensions of strategic management to

measure entrepreneurial behavior in companies [53]. They are scanning intensity, planning flexibility, horizon planning, locus of planning, and control attributes. Of these five, one particular dimension is the most relevant to the current Industry 4.0. It is planning flexibility. This dimension can affect the success and failure of companies in competitive environmental conditions [54][55]. Planning flexibility is measured by (1) changes in opportunistic economic conditions, (2) emergence of new business opportunities, (3) entry of new competitors, (4) changes in customer preferences, (5) emergence of new technologies, and (6) changes in government regulations [56].

C. Business Environment

A company's business environment consists of internal and external environments [57]–[59]. Internal environment involves aspects such as shareholders, management, and employees. Meanwhile, the external environment is the situation outside of a company in the form of competition intensity, market turbulence, and technology that potentially can affect the company's performance in the long run [60]. Business environment can influence company policy in decision-making processes [61] such as the decision to transfer technology from hardware to software (smart technology). In some cases, the business environment can positively impact companies [62]. The intense competition in an increasingly complex business environment requires companies to be more creative and innovative in formulating a variety of appropriate business strategies to be more adaptive and competitive [63]. The interaction of a company with its environment is significant in the innovation process. The environment forces companies to respond if they aim to remain firm in their position[55]. Business environment is measured by the intensity of competition such as promotion, price, and new companies [64].

D. Sustainable Competitive Advantage

A company is considered to have a sustainable competitive advantage if the implementation of its strategy is unable to be carried out simultaneously by its current and potential competitors [65]. Even if these competitors can follow and implement the strategy, they are unable to gain similar or higher benefits [66]. The acquisition of sustainable competitive advantage based on the exploitation of competitive resources is significant for an organization. There are four requirements for a resource to be considered as a source of sustainable competitive advantage [11]. They are: (1) it is a valuable corporate resource, specifically in relation to the ability to seize opportunities and/or neutralize threats from the business environment (*valuable*); (2) it is relatively difficult to develop causing it to be scarce in a competitive environment (*rarity*); (3) it is laborious to be imitated (*inimitable*); and (4) other companies are unable to exploit expensive resources for the benefit of their organizations [67]. The only competitive global business strategy is based on differentiation of quality, product, service technology or cost leadership [12].

E. Hypotheses

A flexible planning system allows companies to adapt and follow changes in the environment [68],[56], [53], [69], [70]. This capability eventually affects competitive advantage [71]. For the entrepreneurship construct, the measured variables are innovation and networks. Innovation

is a tool to change an organization, either as a response to changes in the external environment or as a preventive measure to influence the environment. Specifically, innovation includes new products or services, new process technologies, new organizational structures or administrative systems, or new plans or programs relating to members of the organization [72], [73]. Earlier study evidenced that innovation affects sustainable competitive advantage [55]. The second variable in the entrepreneurship construct is networks. The expansion of business networks affects achieving sustainable competitive advantage [55], [74]. Based on these, this study constructed the structural model as in Figure 1 and hypotheses as follows:

- H1 : Planning Flexibility affects Sustainable Competitive Advantage
- H2 : Entrepreneurship (measured by Innovation and Networks) affects Sustainable Competitive Advantage
- H3 : Planning Flexibility moderated by Business Environment affects Sustainable Competitive Advantage
- H4 : Entrepreneurship (measured by Innovation and Networks) moderated by Business Environment affects Sustainable Competitive Advantage

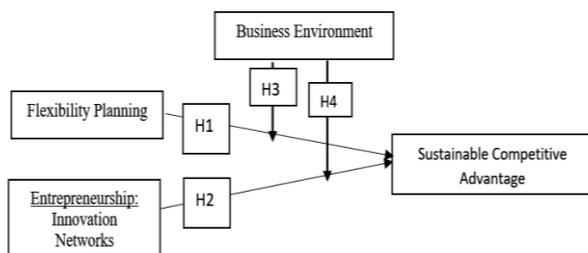


Fig. 1. Structural Model for Sustainable Competitive Advantage Predictors

III. RESEARCH METHODOLOGY

This study investigated manufacturing firms in South Sumatera, Indonesia. This study reviewed the database recorded by the Central Bureau of Statistics in South Sumatera [75] to obtain data. The database showed that the manufacturing firms involve in various sectors such as processing of rubber, processed wood, split stone, coral, plywood, frozen shrimp, mineral water, vermicelli, soy sauce, ground coffee, and CPO. In terms of workforce, the firms differ in size, ranging from a minimum of 25 (in OKU district) to the maximum of 17540 (in the City of Palembang). The firms also have an average operating life of more than 5 years.

This research obtained data through questionnaires. Respondents responded to the questions by choosing the answers provided according to their perceptions (closed questions). Measurement using the Likert scale as follows: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly agree. The respondents in this study were company leaders or middle managers who were considered to have knowledge or information regarding their firms [76].

The variables in this study were sustainable competitive advantage with the dimensions of capability and reputation, flexibility planning, and entrepreneurship with the dimensions of innovation and networks. In all, after the processes, this study received 308 responses.

Regarding data analysis, this study followed the Structural Equation Modeling (SEM) approach to test the proposed hypotheses analyzed using the statistical package AMOS 22.0. The Structural Equation Modeling (SEM) is a multivariate technique that combines aspects of multiple regression and factor analysis to estimate a series of simultaneous interdependent relationships [77], [78], [79]. This method tests the validity of research instruments. A valid instrument shows that it can measure what is intended to be measured [80]. The test used for validity is loading factor test by comparing the t-test results with the standardized regression weights table. If the value of t observation (results obtained) > from the determined value (t-table), then the manifest indicator or variable is valid, or based on a significance level of above 5% ($p > 0.05$) and the loading factor value reaches greater than or equal to 0.5 ($\lambda \geq 0.50$) [78]. Besides, this method also tests reliability. The reliability of each indicator or manifest variable in SEM is shown by the error values of delta error (δ) for exogenous/independent variables and epsilon error (ϵ) for endogenous/dependent variables [81], [82]. Generally, there are two methods to measure reliability. They are constructed reliability and average variance extracted [83]. Further, proposed three methods to measure reliability: individual item reliability, construct reliability, and average variance extracted [84]. This study used these three forms of measurement to measure all variables. The limit used to measure individual item reliability was 0.50 and can be located in the AMOS output in the squared multiple correlation section [84]. While the limit for construct reliability was 0.70 [78].

Furthermore, this study also performed fit model testing based on the criteria of absolute fit measures, incremental fit measures, and parsimonious fit [81]. Criteria for absolute fit measures such as chi-square value of $p > 0.05$, $CMIN/DF < 2$, $GFI > 0.90$, $RMSEA < 0.08$, $AGFI > 0.90$, $NFI > 0.90$, $IFI > 0.90$, and $CFI > 0.90$. Afterward, this study conducted hypotheses testing based on parameter estimation from the complete structural equation model. Hypotheses testing using SEM is based on the value of the parameter regression coefficient of critical ratio (CR) and the probability value. This research accepts the proposed hypotheses if the value of $p < 0.05$ [75].

IV. RESULTS AND DISCUSSION

As shown in Figure 2, this study has re-modified the research model, where the interaction between planning flexibility and the business environment was separated from the interaction between entrepreneurship and the business environment. Based on the results of data processing, it evidenced that indicators X1 and Y1a were invalid because the values were 0.398 and 0.289 ($\lambda \leq 0.50$). On the other hand, X2b, X2a, and Y1b are valid. This research measured data validity from the loading factor value or the estimated value of the indicator ≥ 0.50 . For the reliability test, Table 1 exhibits the results.

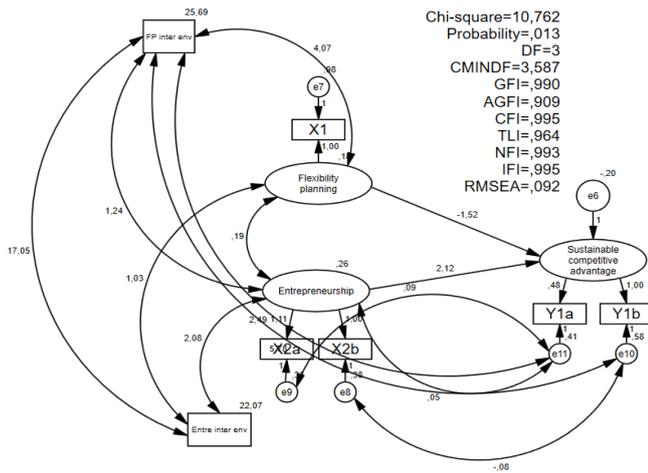


Fig. 2. Data Processing Results

TABLE I. RELIABILITY TEST

Table 1. Reliability Test

Construct	Loading (λ)	λ ²	1-λ ²	CR	AVE	Keterangan	
Flexibility Planning							
x1	0,398	0,158404	0,841596				
Jumlah	0,158404			1	0,158	0,285	Tidak reliabel
Entrepreneurship							
x1a	0,688	0,473344	0,526656				
x1b	0,641	0,410881	0,589119				
Jumlah	1,329	1,766241	1,115775	0,613	0,571	Tidak reliabel	
Sustainable competitive advantage							
Y1a	0,289	0,083521	0,916479				
Y1b	0,511	0,261121	0,738879				
Jumlah	0,800	0,344642	1,655358	0,279	0,444	Tidak reliabel	
Jumlah	0,64			2,295			

Source : Results of data processing, AMOS: 2019

For goodness of fit, the results are as follows: chi-square is 10.762 (fit), probability value is 0.013 (fit), Cmin Df value is 3.567 (poor fit), GFI value is 0.990 (fit), AGFI value is 0.909 (fit), CFI value is 0.995 (fit), TLI value is 0.964 (fit), NFI value is 0.993 (fit), IFI value is 0.995 (fit), and RMSEA value is 0.092 (not fit). Table 2 and Table 3 show the effects of planning flexibility and entrepreneurship on sustainable competitive advantage. On the other hand, Table 4 exhibits the effects of planning flexibility and entrepreneurship on sustainable competitive advantage moderated by the business environment.

TABLE II. REGRESSION WEIGHT

Table 2: Regression Weight (Model 1)

Path	Estimate	S.E.	C.R.	P	Label
Sustainable_competitive_advantage <--- Entrepreneurship	2,123	,691	3,074	,002	par_1
Sustainable_competitive_advantage <--- Flexibility_planning	-1,519	1,182	-1,285	,199	par_7
X1 <--- Flexibility_planning	1,000				
X2b <--- Entrepreneurship	1,000				
X2a <--- Entrepreneurship	1,111	,090	12,386	***	par_3
Y1b <--- Sustainable_competitive_advantage	1,000				
Y1a <--- Sustainable_competitive_advantage	,479	,070	6,854	***	par_4

Source : Results of data processing, AMOS: 2019

TABLE III. STANDARDIZED REGRESSION WEIGHT

Table 3: Standardized Regression Weight

Path	Estimate
Sustainable_competitive_advantage <--- Entrepreneurship	2,398
Sustainable_competitive_advantage <--- Flexibility_planning	-1,435
X1 <--- Flexibility_planning	,398
X2b <--- Entrepreneurship	,641
X2a <--- Entrepreneurship	,688
Y1b <--- Sustainable_competitive_advantage	,511
Y1a <--- Sustainable_competitive_advantage	,289

Source : Results of data processing, Amos : 2019

Based on the results presented in Table 1, Entrepreneurship construct (innovation & networks) has a significant effect on sustainable competitive advantage (Y) with a significance of P-Value $0.002 < 0.05$ or $CR 3.074 > 1.96$. These results corroborate previous studies [85], [86], [87]. As for planning flexibility, the construct does not affect sustainable competitive advantage as indicated by the P-Value $0.199 > 0.05$ or $CR -1.285 < 1.96$. The table also shows that the measurement of entrepreneurship through innovation is precise, as evidenced by the significance value below 0.05 (***) or CR value of $12.338 > 1.96$. Similarly, the measurement of sustainable competitive advantage through capability is precise as indicated by the significance value below 0.05 (***) or a CR value of $6.854 > 1.96$.

Furthermore, Table 4 proves that business environment provides a significant influence on the interaction of planning flexibility and entrepreneurship toward sustainable competitive advantage with a CR value of $10.785 > 1.96$ or a value of $P < 0.5$. For the hypotheses testing, Table 5 shows the results.

TABLE IV. REGRESSION WEIGHT (Model 2)

Table 4: Regression Weight (Model 2)

Path	Estimate	S.E.	C.R.	P	Label
Sustainable Comp Adj <--- Flexibility Planning	-,158	,030	-5,217	***	par_1
Sustainable Comp Adj <--- Entrepreneurship	,245	,048	5,066	***	par_2
Sustainable Comp Adj <--- Business Environ	,045	,004	10,785	***	par_5

Source : Results of data processing, 2019

TABLE V. HYPOTHESES TESTING

Table 5: Hypotheses Testing

Hipotesis	Nilai CR	Probability	Description (p < 0.05)
H1	-1,285	,199	Rejected
H2	3,074	,002	Accepted
H3	10,785	***	Accepted
H4	10,785	***	Accepted

Source : Results of data processing, 2019

V. CONCLUSION

This study offers some substantial contributions. The analysis established the importance of planning flexibility and entrepreneurship on sustainable competitive advantage in the manufacturing industry. This research discovers that planning flexibility does not affect sustainable competitive advantage. Conversely, entrepreneurship affects sustainable competitive advantage. In analyzing the moderating effects of the business environment on the model's structural relationships, this study reveals both planning flexibility and entrepreneurship influence sustainable competitive advantage. Such findings extend the body of knowledge and depth of understanding of planning flexibility,

entrepreneurship, and sustainable competitive advantage in the manufacturing industry.

From the practical viewpoint, the findings provide insight for manufacturing firms on the importance of entrepreneurship and planning flexibility to enhance their sustainable competitive advantage. Additionally, this research can be beneficial for local governments as a basis for developing regional economic development policies through strengthening manufacturing industry by encouraging innovation, expanding business networks, and directing companies to be more flexible in preparing their business plans.

For further research, it is also important to include intervening/mediating variables (e.g., entrepreneurial orientation or social media), to measure the influence of planning flexibility and entrepreneurship on sustainable competitive advantage.

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