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Triple Helix: How the Model Affects Small Medium-Sized Enterprises

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Abstract. A Cross-sector collaboration among university, government, and industry/business in the context of the Triple Helix model has become the central issue of addressing the growth of the global economy, particularly, Small and Medium-Sized Enterprises (SMEs). Thus, the purpose of this study was to examine the effect of three leading actors in the Triple Helix model to the development of SMEs. The study employed a quantitative approach and Structural Equitation Model (SEM) to find out the effects of three helixes on SMEs. 246 respondents of SMEs from two regions; the province of Bandung and Banten took part in an online survey. The findings reported that the government, industry, and government affect positively to small and medium-sized enterprises. It indicates that the Triple Helix model plays a significant contribution to SMEs.

Keywords*: triple helix model; small and medium-sized enterprises; entrepreneurship; creative industry.*

1. INTRODUCTION

The Triple Helix model is fast becoming a key instrument in the economic advances of a region. The interaction of three helixes, namely university, government, and industry/business in the Triple Helix model can create innovation and constitute a basic foundation of economic development, which is particularly recognized through entrepreneurship developed in small and medium-sized enterprises (SMEs). As a part of the creative industry, SMEs bring about positive outlooks both in developing and developed countries. For instance, in German and other European countries, SMEs are well-thought-out to the backbone of the nation and provide local economies for 99 percent of private-sector commercial [1]–[3]. Thurik even highlighted that entrepreneurship developed in SMEs is the engine of the nation's economic growth [4]. In African countries, SMEs become the key instrument of socio-economic development and poverty reduction [5] as well as have a significant contribution to the Gross Domestic Product of Nigeria from 1982-2012 [6]. In the words of Carpentier, Landveld, and Shahiar, SMEs are estimated to provide 600 million new occupations by the year of 2030 in other developing countries and sub-Saharan Africa [7].

As a developing country, Indonesian MSMEs supply 60% of the Gross Domestic Product (GDP), provides 89% of private-sector employment, and make up 99% for all companies. Despite facing much potential economic turmoil, GDP growth remains strong for 2018 to 2019 at a forecast of 5.3 percent, but still below the 7 percent target [8]. The Central Statistical Bureau reported that Indonesia's economy grew by 5.7 percent in the quarter I-2019, reaching IDR 3782.4 trillion [9]. Agreeing with these statements, Padachi and Bhiwajee pointed out that not only do SMEs contribute to poverty alleviation, but they also provide employment and source of livelihood for millions of people across the world [10]. Karaev, Koh, and Szamosi have noted two challenges encountered by SMEs in the face of the

current global business competition such as the ASEAN economic community. The first challenge is they need to respond to business opportunities, which due to globalization is widely accessible. In the second one, to develop their business, they should create and keep up business networks. If they do not respond immediately to challenges, the performance, the activity, and the sustainability of SMEs will be hindered [11]. Under these circumstances, the Triple Helix model, which is firstly coined by Etzkowitz & Leydesdorff [12] is recognized as providing social and economic benefits especially when three helixes are collaborating on innovation infrastructure [13].

Previous studies have found that the triple helix idea provides advantages in different forms of collaboration [14]–[16] since their collaboration produces a knowledge sharing that leads to innovation [17]. Therefore, the collaboration between universities, private corporations, and government bodies is highly essential in the development of SMEs in order to increase economic growth, social welfare, and competitiveness. As Rostek argued that, for small and medium-sized companies to succeed in a changing environment and strong business competition [18], they need to boost their profitability as their competitiveness often improves their negotiating position in a business competition [19]. To fill this study's void, this study explores the impact of three helixes on the growth of small and medium-sized enterprises as an innovative industry to support them in a competitive era.

2. METHODS

Participants: 246 SMEs situated in the province of Bandung and the regency of Serang, Pandeglang, and Tangerang Selatan, Banten participated in the research. The regions are the representatives of the West Java population and Banten population in Indonesia. Bandung has been well known as a creative city since it has a numerous of SMEs, whereas Tangerang Selatan is famous for its name, "The city of lifestyle gateway" since it is closed to Jakarta, the capital city of Indonesia, which has four functions: a residential city, merchant city, education city, and service city. Besides, Tangerang Selatan has a large number of SMEs account for 23.781 in 2018. However, Serang and Pandeglang, which were included in the research, just took a small part of the sample. The characteristics of the sample include gender, age, level of education, length of business, business turnover, business assets, kinds of business, and kinds of ownership as presented in detail in table 1.

TABLE 1. Demographic Characteristics of the Sample

Characteristics	Description	Number	Percentage
Gender	Male	103	41.87
	Female	141	57.32
	Unknown	2	0.81
Age	21-40 years old	73	29.67
	41- 60 years old	67	27.24
	61 -70 years old	23	9.35
	Unknown	83	33.74
Level of education	Elementary school	1	0.40
	Junior high school	3	1.22
	Senior high school	75	30.49
	The diploma I/II/III	10	4.07
	Undergraduate	153	62.19
	Graduate	4	1.63
The length of business	1-5 years	63	25.61
	6-10 years	79	32.12
	11-15 years	43	17.47
	More than 15 years	61	24.80
Business turnover	Less than 50 million rupiahs	20	8.13
	50- 300 million rupiahs	94	38.21
	> 300 – 2.5 billion rupiahs	118	47.97
	> 2.5 – 50 billion rupiahs	14	5.69
Business assets	Less than 50 million rupiahs	31	12.61
	50 – 500 million rupiahs	155	63
	> 500 million – 10 billion rupiahs	60	24.39
Kinds of business	Culinary	79	32.12
	Crafts	50	20.33

	Fashion	64	26.01
	Mixed business (culinary + craft)	44	17.88
	Other	9	3.66
Kinds of ownership	Family business	20	8.14
	Individual business	223	90.65
	Franchise	1	0.40
	Other partnership	2	0.81

Research Design: The study emphasizes examining the effects of three cross-sector collaborators of the Triple Helix model, university, industry, and government to the growth of SMEs in two provinces; Bandung and Banten in Indonesia. Thus, the study employed Structural Equitation Modeling (SEM) by using Lisrel as a part of the quantitative approach. The participants must respond to the items by using a 5-point, Likert scale ranging from (1) strongly disagree to (5) strongly agree to 11 items of University, 12 items of Government, and 11 items of industry.

Procedures: The data were collected through a face-to-face survey during Focus Group Discussion (FGD) conducted on 21 October 2019 in Bandung, online survey, and telephone calls. For the 20 participants of FGD, they received tumblers with the logo of our university. The participants of FGD, then, assisted us to share the questionnaire through WhatsApp social media to their community. We also contacted SMEs to fill the questionnaire through WhatsApp since we got the catalog containing the information about SMEs from the personnel staff of the Department of cooperatives, small and medium businesses of Tangerang Selatan. For SMEs in Serang and Pandeglang, in addition to making a phone call to them, we made contact with them via WhatsApp as well.

3. RESULTS AND DISCUSSION

Based on the analysis of using a histogram, the questionnaire has 24 outlier data that must be removed to produce a good and valid analysis. So, the net data used for this study is 222 data.

3.1. Reliability of data

This study used the Cronbach's Alpha coefficient of at least 0.5. If the value is above 0.5, then the question items in the questionnaire are reliable. The items in the questionnaire for university, government, and industry variables are reliable, which has a Cronbach's Alpha value > = 0.5 as seen in the below table

TABLE 2. Reliability of data

Reliability Statistics		
Variable	Cronbach's Alpha	N of Items
University	.990	11
Government	.899	12
Industry	.965	11

3.2. Test for Composite Variables

The next step is to re-do the descriptive analysis of data that does not involve outlier data and deleted variables. The following are findings based on the analysis of each composite variable.

TABLE 3. The results of the composite variable test on the university variable **Statistics**

		A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**
N	Valid	222	222	222	222	222	222	222	222	222	222	222
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		2.5180	2.8108	2.4910	2.9009	2.7523	2.7613	2.6622	2.4099	2.7252	2.7432	2.6757
Std. Deviation		1.13247	1.32168	1.09603	1.42349	1.28580	1.28399	1.23241	1.15280	1.27673	1.26985	1.22317
Variance		1.282	1.747	1.201	2.026	1.653	1.649	1.519	1.329	1.630	1.613	1.496
Skewness		.370	.033	.429	.053	.060	.015	.170	.651	.080	.052	.133
Std. Error of Skewness		.163	.163	.163	.163	.163	.163	.163	.163	.163	.163	.163
Kurtosis		-.738	-1.433	-.440	-1.500	-1.396	-1.450	-1.238	-.434	-1.381	-1.323	-1.155
Std. Error of Kurtosis		.325	.325	.325	.325	.325	.325	.325	.325	.325	.325	.325

TABLE 4. The results of the composite variable test on the government variable

Statistics

		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
N	Valid	222	222	222	222	222	222	222	222	222	222	222	222
	Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.8514	4.1892	4.4595	3.9189	3.9099	4.5450	3.8919	4.5631	4.0495	3.9910	4.1216	4.0405
Std. Deviation		.65941	.55492	.62791	.50581	.52191	.49909	.72263	.51501	.39485	.41457	.39059	.41811
Variance		.435	.308	.394	.256	.272	.249	.522	.265	.156	.172	.153	.175
Skewness		-.309	-.752	-1.284	-1.204	-1.078	-.182	.166	-.456	-.011	-1.216	1.096	-.107
Std. Error of Skewness		.163	.163	.163	.163	.163	.163	.163	.163	.163	.163	.163	.163
Kurtosis		.318	3.940	2.992	4.395	3.661	-1.985	-1.067	-1.328	5.858	8.497	2.353	4.702
Std. Error of Kurtosis		.325	.325	.325	.325	.325	.325	.325	.325	.325	.325	.325	.325

TABLE 5. The results of the composite variable test on the industry variable

Statistics

		I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11
N	Valid	222	222	222	222	222	222	222	222	222	222	222
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		3.8153	3.8694	3.5450	4.0946	3.8468	3.8514	3.3559	3.8694	3.7252	3.8288	3.5000
Std. Deviation		.67075	.64243	.74618	.72140	.62668	.63849	.85323	.67002	.68016	.63636	.78878
Variance		.450	.413	.557	.520	.393	.408	.728	.449	.463	.405	.622
Skewness		-2.035	-2.458	-.749	-1.895	-2.548	-2.387	-.491	-2.211	-1.772	-2.391	-.698
Std. Error of Skewness		.163	.163	.163	.163	.163	.163	.163	.163	.163	.163	.163
Kurtosis		6.308	8.723	1.678	6.877	9.123	8.430	.031	7.310	4.719	8.177	1.029
Std. Error of Kurtosis		.325	.325	.325	.325	.325	.325	.325	.325	.325	.325	.325

Based on the analysis of each composite variable as shown in Table 3. 4 and 5, it concluded that 1) The standard error value, which is seen from the standard error of skewness and the standard error of kurtosis, on the university, government, and industry variables are very small, which is below 1. So that it can be said that the entire sample can accurately represent the entire population; 2) in the standard deviation and variance values, the university variable shows the value above 1. This indicates that data variations are too high, whereas the Government and industry variables show a value below 1, which indicates that data variation is not too high; 3) In kurtosis values, it is known that there is no frequency in one class that is very extreme when compared to the frequency in other classes. The ideal kurtosis value is under 3, then the university variable has reached the ideal kurtosis value, while the Government and industry variables do not reach the ideal kurtosis value; 4) The data is declared normally distributed when the skewness value is in the range of values from -2 to 2. Thus, the data on all variables are normally distributed.

3.3. The analysis of Structural Equation Modeling (SEM)

a. The hypothesis

Hypothesis 1: University variable has a positive effect on the government on the development of SMEs

Hypothesis 2: University variable has a positive effect on the industry on the development of SMEs

Hypothesis 3: Industry variable has a positive effect on the government on the development of SMEs

b. Initial Measurement (Measurement Model)

The initial measurement phase aims to determine the value of error variance, t-value, and Standardized Loading Factor (SLF) and processed with Lisrel 8 software. In this section, the Confirmatory Factor Analysis (CFA) method is used to evaluate each variable that has a question

item, which is really appropriate. Here are the results of running from the Lisrel software.

TABLE 6. Threshold 1

Threshold 1:	
Error variance	all +
SLF	>= 0.5
t-value	>= 2.75

It is concluded that in the iteration 1 running of CFA results, the error variance, t-value, and SLF values have fulfilled the specified criteria (see Threshold 1 table). Then the model is valid so that it can proceed to the next stage.

c. Test Validity and Reliability of SEM

This stage tests the validity and reliability of each question item. The validity test aims to see the accuracy of the question items for each variable. The reliability test is then performed to determine the consistency of measurement of the constituent question items. In this study, the reliability test was carried out using Construct Reliability (CR). CR can be calculated with the following formula.

$$CR = \frac{(\Sigma \text{SLF})^2}{(\Sigma \text{SLF})^2 + \Sigma e_j}$$

The value of e_j is obtained from the results of running, namely the error variance of each question item. The standard CR value used in this study is > = 0.7. The following results of CR presented as follows: university is 0.99, government is 0.97, and industry is 0.98. Based on the results, it indicated that all CR values above meet the CR standard values per variable.

d. Structural Test Model

At this stage, the overall model test is conducted to find out whether the overall model is fit or not. Testing the whole model uses criteria from the goodness of fit index and t-value (> = 2.75). If the test scores meet the cut off values of each criterion, then the whole model is said to be fit. Here are the results of the goodness of fit for the structural model test.

TABLE 7. The Results of the goodness of fit for the structural model test

No.	Goodness of fit	Cut-off value	Value	Remark
Absolute fit indices				
1	RMR	<= 0.10	0.049	Fit
Incremental fit indices				
2	CFI	>= 0.9	0.95	Fit
3	IFI	>= 0.9	0.95	Fit
Parsimony fit indices				
4	PNFI	0.60-0.90	0.88	Fit
5	PGFI	0.50-1.00	0.57	Fit

Hypothesis	Path	t-value	Remark
H1	A - G	5.63	Accepted
H2	A - I	6.41	Accepted
H3	I - G	9.12	Accepted

Based on the table above, all hypotheses are accepted, namely, the three variables have a positive influence on the development of creative SMEs. Below figures 2 and 3 are Lisrel running results about Measurement Model Test (t-value Structural Model Test (t-value).

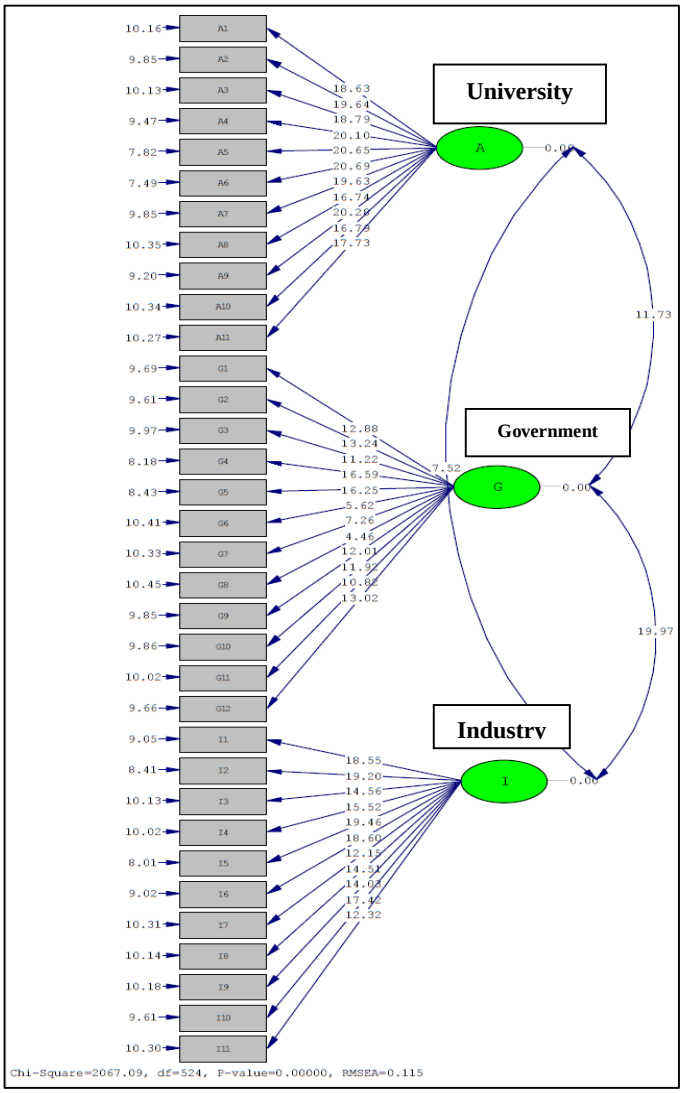

FIGURE 1. The Result of Measurement Model Test (t-value)

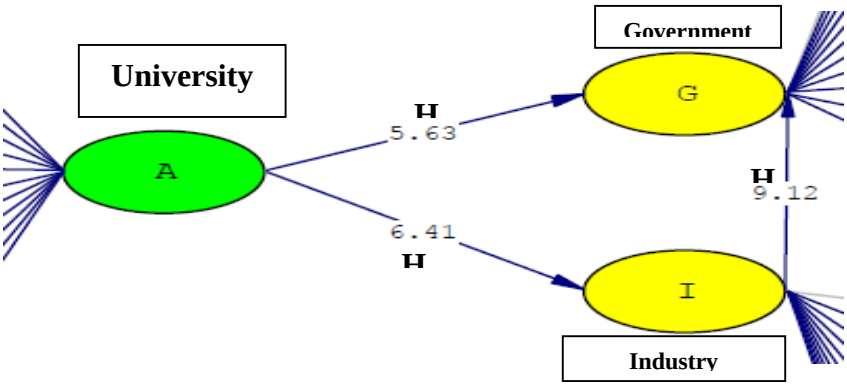

FIGURE 2. Structural Model Test (t-value)

The hypothesis of this study has been proven that three helixes; namely University, Government, and Industry affected positively to the development of small and medium-sized enterprises. This finding is similar to

other studies conducted by Brink and Madsen, and Ueasangkomsate and Jangkot, which found out that the Triple Helix-related partnership between SMEs and the industrial sector and government has a positive effect. This partnership has improved creativity, efficiency, innovation, and the performance for SMEs [20], [21], while at the same time, the partnership also demonstrates potential benefits for SMEs in emerging economies in working with Triple Helix Agents to boost their success in innovation. Their involvement leads to and supports both triple helix and SMEs [20]. According to Etzkowitz, such experiences of interaction improve the conditions for development in knowledge-based societies and also become a catalyst for innovation as they contribute to the conversion of science and technology into economic progress [22]. Pugh found that since Devolution, Triple Helix strategies have been prominently featured with mixed success in Welsh development strategy and programs [23]. Nevertheless, Pugh also criticized the government, which focused too heavily on universities as drivers of innovation and economic development at the expense of business, especially in a weaker region. In addition to the positive effect of Triple Helix collaboration, Wang highlights some of the limitations and flaws of the university-industry-academy and presents the evolutionary path to Triple Helix of university-industry-government collaboration and development to address these practical and theoretical challenges [24].

Nata´rio, Couto, Almeida also revealed the presence of a positive relationship between the dynamics of the triple helix model in terms of the different types and objectives to be innovated that is concerning the introduction of new products as well as ecological innovation and their efforts to develop communication about the barriers to innovation – obviously, the lack of information and the geographical site, the corporations' innovation performance and the level of cooperation and interaction with the university giving them benefits in obtaining additional financial resources and prestige for the researcher, as well as in obtaining information for the process of education [25].

The concept of the Triple Helix model has been employed in various countries as an organizational technique for regional development, for instance, in Sweden [26] and Ethiopia to further the knowledge-based economy [27]. In Brazil, the Triple Helix has become a university-based "movement" to generate incubators [28]. In Indonesia, the cluster method is one of the innovation-based business incubation practices in an incubator that has also been implemented in many countries. The aim of the business clustering method enables the delivery of cheaper and better resources to industry, LEs, universities, and other development-supporting organizations [29]. Tambunan also identified that clustering benefits SME growth and rural development in Indonesia, as the majority of SMEs are located in rural areas. Since the interactions between Triple Helix actors, such as higher education institutions (HEIs), businesses, and government agencies, are at the root of innovation and are a fundamental premise of economic development [23], [30]. The collaboration of three leading players needs to be intensified and must be designed in a systematic scheme to avoid the confusion of SMEs. Based on the research findings and discussion, it indicates that the collaboration of university, government, and industry/business has affected the SMEs' performance and innovation and brings a significant impact but with some limitations and barriers, which are required to be evaluated.

4. CONCLUSIONS

The findings have revealed the positive impacts of Triple Helix collaboration in Indonesia, particularly to the development of small and Medium-sized enterprises, which enable them to produce creativity and innovation of their products and their sustainability. With the assistance of three helixes in terms of cross-sector collaboration, SMEs can survive and improve performance and produce better and more innovative products. Thus, this study highlights the significance of the implementation of the Triple Helix model in any collaboration, particularly among three leading sectors for regional development and economic welfare of society and to promote the knowledge-based economy.

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