

## Validation Studies a Questionnaire Developed to Measure Incubator Business Technology Performance Using PLS-SEM Approach

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**Abstract**—The aims of this study is to test the validity and reliability of adapted scales of nine variables of Incubator Business Technology Performance factors. A total of 168 Incubator Business Managers participated in this study. Data were analyzed through confirmatory factor analysis (CFA), by using the partial least square structural equation modelling (PLS-SEM) approach. The reliability criteria were determined through outer loading and composite reliability (CR). The assessment of convergent validity was performed using the average variance extracted (AVE), while the discriminant validity of this instrument was confirmed using the heterotrait–monotrait criterion (HTMT), along with the bootstrapping procedure. The assessment of validity and reliability, through PLS-SEM, indicated that the scales used in this study are valid and statistically reliable. Testing in this research looks at whether the questions in the questionnaire are valid or not by going through two stages of convergent validity and discriminant validity. his research looks at the results of convergent validity analysis to consider the results of factor loading indicators on relevant factors, the results of testing the validity of all factors with a value greater than 0.50, one of which is an AVE value of 0.550, indicating that the indicators in these variables have a strong contribution in measuring the desired construct, and the reliability test of all variables is reliable because it exceeds 0.70, one of which is the facility variable which has a value of 0.858.

**Keywords:** *Incubator Business Technology, Questionnaire, Reliability, Structural Equation Modelling, Testing, Validity, Variables.*

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### 1. Introduction

Technological developments have become a major driver of change in the business world. As technology develops rapidly, companies must adapt to remain competitive and grow. The ability to innovate and utilize technology is a key factor in business success at this time. Companies that are able to keep up with technological developments can increase their work effectiveness and performance [1]. Apart from that, technological developments have also influenced the global trading system, creating increasingly fierce competition in the global market [2]. The development of digital technology, in particular, has changed the way businesses operate. Digital technology enables fast and efficient communication, as well as transactions without geographic restrictions.

The Indonesian government has also supported the growth of digital startups in the country. The government not only acts as a regulator, but also as a facilitator and accelerator for the startup ecosystem. The government seeks to create a conducive environment for the growth of technopreneurs and seeks to increase the contribution of the digital economy to gross domestic product (GDP) [3]. Currently, Indonesia has seen the development of a major technology hub in ASEAN, supported by

various parties, including the government, venture capital, investors and the local market. Despite great potential, not all digital startups are successful in the face of fierce competition. Most new startups face challenges in managing their business, mainly due to lack of adequate business skills, inadequate planning, poor management, failure to manage technology investments, and financial problems. According to Yudi Candra (2019), around 99% of the 1,500 to 1,700 startups in Indonesia fail. Therefore, new startups need support and guidance, such as can be provided by technology business incubators, to be better prepared and focused in competing in the market.

A technology business incubator is a program carried out to provide special treatment along with development and training to new business owners, so that later the business can develop better and develop into a large business. Incubation is a process of coaching, mentoring and development provided by the entrepreneurial incubator to incubation participants. Incubation participants are entrepreneurs or business owners undergoing the incubation process. The development of business incubators can be seen in the existence of the Indonesian Business Incubator Association (AIBI) and the Ministry of Research, Technology and Higher Education for 2021 with 183 Business Incubator members spread throughout Indonesia, both from universities and government.

Technology business incubators aim to encourage the technological development of new stage companies and businesses promoted by business incubators [4]. The most important factors in business incubators are good performance, project sustainability, and recognition, because economic growth based on knowledge, technology and innovation is considered an important component of performance [5]. Technology Business Incubators generally have several limitations, both in terms of process, quality, incubation facilities, and low efficiency and financial independence. Based on research [6], there are several things that are considered to influence the performance of the Technology Business Incubator, including support, incubator governance, networks, facilities and linkage with university.

The factors that influence the performance of technology business incubators in Indonesia are the variables that will be tested. Before these variables are used for factors that influence performance, a validity and reliability test is carried out on the questionnaire to continue this research using the Structural Equation Modeling (SEM) method and in this research, researchers try to add other things which are factors to the Knowledge Based View, such as knowledge management as a mediating variable and knowledge inertia as a moderating variable between support and performance. Apart from that, the startup's own perspective is also important to understand the extent to which technology business incubators provide added value for them. An in-depth understanding of Business Incubator Performance, Facilities, Incubator Capabilities, Technology Business Incubator, Linkage with University, and Networking is very relevant in the current technology business context.

## **2. Method**

### **2.1 Literature Review**

The theoretical paradigm in examining technology business incubator performance factors, including resource based theory and knowledge based theory [7]. According to [8], the resource based view concept plays an important role in strategic management, where this concept states that an organization is able to achieve sustainable competitive advantage if it has resources that are valuable, rare, unique and difficult to imitate. Based on resource based view, the organization can determine the strategy that will be carried out in accordance with the organization's capabilities. The performance factors of technology business incubators which are classified as RBV Incubator Capability can be measured in several dimensions, such as infrastructure, finance, management, marketing and personnel deployment [9]. Then expanding networks with internal organizations helps tenant companies increase competitiveness, networking with external organizations helps entrepreneurs obtain important resources such as financial support, new technology, and market input [10][11] stated that strong network services have a positive and significant influence on business incubators. Various facilities are shared by incubates, to help them invest money in other relevant activities [12]. [13] considers the facilities provided by technology business incubators as enterprise support systems and categorizes the facilities as infrastructure support while the services as management and technology support. In the

context of technology business incubators, community support can take the form of support from universities, government, investors and the local startup community. This support can help technology business incubators build competencies and create competitive advantages in startup companies [14].

Meanwhile, knowledge based view is a further development of resource based view. According to [15], knowledge based view plays a role in creating human capital involvement which allows companies to adapt to various problems effectively and efficiently. This makes HR improvement structured and more dominant. Knowledge management in start-ups has a significant effect on improving performance through positive contributions to sustainable start-up growth by improving financial, environmental, human, market, organizational, relational, technical and technological performance [16]. Factors influencing knowledge management, [17] show that government objectives vary in each country, because some countries' governments support entrepreneurship to create jobs, others to create competition in the market and innovation. [18] investigated that initial capital support is necessary for success and [19] stated that business incubators play an important role in providing supporting funds for fund formation. The key factor for the success of the existence of a business incubator, apart from funding, is the availability of professional staff who are able to manage the incubator in accordance with the governance that applies globally [20]. According to [21], knowledge inertia provides empirical evidence to support, namely consisting of two dimensions: experience and learning inertia. One of the things that influences company performance is knowledge lag caused by a lack of knowledge and thinking about innovative behavior. Therefore, companies need to create an organizational culture that is able to overcome organizational inertia and encourage innovation and change [22].

The grouping of factors that influence the performance of the Technology Business Incubator can be briefly seen in Table 1 as follows:

**Table 1.** Grouping of Technology Business Incubator Performance Factors

<b>Resource Based View</b>		<b>Knowledge Based View</b>	
1.	Incubator Capabilities	1.	Knowledge Management
	a. Network		a. Government Support
	b. Facility		b. Funding Support
	c. Community Support		c. Governance Incubator
2.	Linkages with the University	2.	Knowledge Inertia
		3.	Organizational Inertia

The variables in this research consist of a dependent variable and an independent variable. The dependent variable in this research is the performance of technology business incubators, while the independent variable in the research refers to the factors that influence the performance of technology business incubators as determined by Ravi [6] and several other studies. These factors were compiled using a structured questionnaire and survey method which is a more appropriate way to collect data nationally. The questionnaire was created based on statements related to the performance factors of the Technology Business Incubator in Indonesia.

## 2.2 Research Methods

### Research methods

The data obtained through the questionnaire was processed using the Structural Equation Modeling (SEM) method to identify factors that influence the performance of business incubators in Indonesia.

### Population and Sample

The population in this study are organizations that are affiliated with the Indonesian Business Incubator Association (AIBI) and the Ministry of Research, Technology and Higher Education,

including business incubators belonging to ministries, local governments, the private sector and universities, there are 182 Technology Business Incubators in Indonesia.

### **Data collection technique**

Data collection in this research was carried out by collecting primary data and secondary data as follows:

a) Primary data

Primary data collection was carried out using Focus Group Discussion (FGD). FGD aims to obtain informative, in-depth and valuable data, as well as to collect more data in a short time. Through FGD, motivation, reasons, arguments or the basis of opinions expressed by a person or group can be identified. However, to provide added value so that it becomes a reference in concluding research results, the results of the discussion need to be accompanied by supporting data or followed up with quantitative methods.

b) Secondary Data

Secondary data in the research was obtained from data from the Indonesian Business Incubator Association. The data collected is incubator data at every university in Indonesia.

### **Data Analysis Techniques**

Outer Model Test aims to test whether the questionnaire used in this research is feasible (valid and reliable) or not. The outer model test is carried out in two stages, namely validity testing and reliability testing.

a) Validity test

The validity test is carried out to see whether the question items in the questionnaire are valid or not. Validity testing is carried out in two stages, namely convergent validity and discriminant validity. The first stage, namely convergent validity, is carried out with the aim of finding out the correlation between indicators and their latent variables. The second stage is discriminant validity which aims to find out whether the latent variable has adequate discriminant value.

b) Reliability Test

A reliability test is carried out to find out whether the statement items in a questionnaire are reliable and consistent in measuring the same symptoms in respondents.

## **3. Result and Discussion**

### **3.1 Result**

In this study, all the original scales covering sources of self-efficacy and science self-efficacy were translated into Indonesian and combined into one scale. The codes used in these scales are listed in Table 1. The translated items with their English abbreviation codes are shown in Table 2.

**Table 2** Variables and code used in this scale

<b>Variables</b>	<b>Code</b>
Knowledge Management	KM
Dimensions:	
Government Support	GS
Funding Support	FS
Incubator Governance	IG
Incubator Capabilities	IC
Dimensions:	
Infrastructure Facilities	FS
Networking	N
mediation variable	
Dimensions:	
Knowledge Inertia	KI
Linkage with University	LU
Business Incubator Performance	BIB

In these results there is a description of the respondent's profile which involves demographic variables such as position, age, gender and incubator ownership. The frequency of each category will be analyzed and explained to provide a more complete view of the characteristics of the respondents involved in the research. Apart from that, this sub-chapter will also discuss the results of descriptive statistics which detail parameters such as minimum (Min), maximum (Max), average (Mean), Standard Deviation, and Coefficient of Variation values. This analysis provides an overview of the variability and uniformity of the data collected. Next, this introduction sub-chapter leads to the specific analysis methods used, namely Confirmatory Factor Analysis (CFA) and Equation Model Analysis.

**Table 3** Respondent Profile

<b>Position</b>	<b>Total</b>
Head	89
Manager	68
Director	6
Secretary	4
Deputy head	1
<b>Gender</b>	
Man	112
Woman	56
<b>Incubator Ownership</b>	
Government	34
Private	11
University	123
<b>Age</b>	
12 - 25	4
26 - 45	92
45 - 65	72

This descriptive statistical analysis aims to provide a deeper understanding of the characteristics and variations that exist within the respondent group, with a focus on key variables such as position, gender, incubator ownership, and age. A number of statistical parameters are described which include mean (average), median (middle value), minimum value, maximum value, standard deviation and coefficient of variation. as in Table 4

**Table 4** Descriptive Statistics

<b>Indicator</b>	<b>Mean</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>	<b>Std, Deviation</b>	<b>Coefficient of Variation</b>
FS1	3,851	4	1	5	1.05	27,266
FS2	4,208	4	1	5	0.739	17,562
FS3	4,161	4	1	5	0.774	18,601
FS4	4,423	5	1	5	0.82	18,539
FS5	4,262	4	1	5	0.854	20,038
GS1	4,012	4	1	5	0.873	21,760
GS2	4,268	4	1	5	0.855	20,033
GS3	4,548	5	1	5	0.746	16,403
GS4	4,536	5	1	5	0.771	16,997
GS5	4,036	4	1	5	0.993	24,604
IG1	4,417	5	1	5	0.751	17,002
IG2	3.75	4	1	5	0.885	23,600
IG3	3,548	4	1	5	0.83	23,393
IG4	4,167	4	1	5	0.769	18,455
LU1	4,357	4	1	5	0.758	17,397
LU2	4,423	5	1	5	0.835	18,879
LU3	4,405	5	1	5	0.758	17,208
LU4	4,238	4	1	5	0.861	20,316
LU5	4,393	5	1	5	0.756	17,209
LU6	4,179	4	1	5	0.782	18,713
LU7	4,048	4	1	5	0.885	21,863
F1	3,994	4	1	5	0.942	23,585
F2	4.28	4	1	5	0.715	16,706
F3	3,554	4	1	5	1,106	31,120
F4	3,952	4	1	5	0.931	23,558
F5	4.03	4	1	5	0.834	20,695
N1	4,524	5	1	5	0.577	12,754
N2	4,458	5	1	5	0.671	15,052
N3	3,369	3	1	5	0.985	29,237
N4	4,393	5	1	5	0.74	16,845
N5	4.22	4	1	5	0.782	18,531
N6	4,292	4	1	5	0.774	18,034
N7	4,185	4	1	5	0.936	22,366
IC1	4,143	4	1	5	0.701	16,920
IC2	4,202	4	1	5	0.736	17,515
IC3	3,946	4	1	5	0.888	22,504

<b>Indicator</b>	<b>Mean</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>	<b>Std, Deviation</b>	<b>Coefficient of Variation</b>
KM1	4,423	4	1	5	0.612	13,837
KM2	4,327	4	1	5	0.65	15,022
KM3	4,054	4	1	5	0.947	23,360
KM4	4,292	4	1	5	0.718	16,729
KM5	4,488	5	1	5	0.617	13,748
KM6	4,446	5	1	5	0.662	14,890
FKI1	3,988	4	1	5	0.699	17,528
KI2	4,036	4	1	5	0.706	17,493
KI3	4,012	4	1	5	0.756	18,843
KI4	4,125	4	1	5	0.709	17,188
BIB1	3,946	4	1	5	0.888	22,504
BIB2	3,857	4	1	5	0.921	23,879
BIB3	4,077	4	1	5	0.824	20,211
BIB4	4,024	4	1	5	0.852	21,173
BIB5	3,911	4	1	5	0.969	24,776
BIB6	4,042	4	1	5	0.868	21,475
BIB7	3,869	4	1	5	0.877	22,667
BIB8	3,857	4	1	5	0.847	21,960
BIB9	4,018	4	1	5	0.869	21,628
BIB10	3,964	4	1	5	0.851	21,468

Based on Table 3. this analysis will use parameters such as factor loading, Composite Reliability (CR), and Average Variance Extracted (AVE) to evaluate convergent validity. The results of this analysis will provide a more in-depth picture of the extent to which our indicators are reliable in measuring the construct under study. When conducting SEM PLS testing, two types of tests are performed: the measurement model test and the inner model test. The measurement model assesses internal consistency through composite reliability (CR), confirms convergent validity via AVE value, and ensures discriminant validity by examining the Fornell-Larcker Criterion value, cross-loading measured by factor loading, and HTMT correlation ratio [23], [24]. Regarding reliability testing, [25] argue that CR is a better measure of internal consistency than Cronbach's alpha. According to [25], the CR threshold value should exceed 0.7. As depicted in Table 3, all latent variable values surpass 0.7, meeting the criteria set by [26]. For convergent validity measurement, [25] suggest an AVE threshold value of 0.50 or higher, with factor loadings ideally exceeding 0.7, although loadings between 0.4 and 0.7 may be acceptable if removing an item impacts other quality parameters. Furthermore, the AVE values for all constructs exceeded 0.5, with most factor loadings surpassing 0.7

**Table 5.** Summary of outer loading, CR and AVE of constructs and indicators before adjustment.

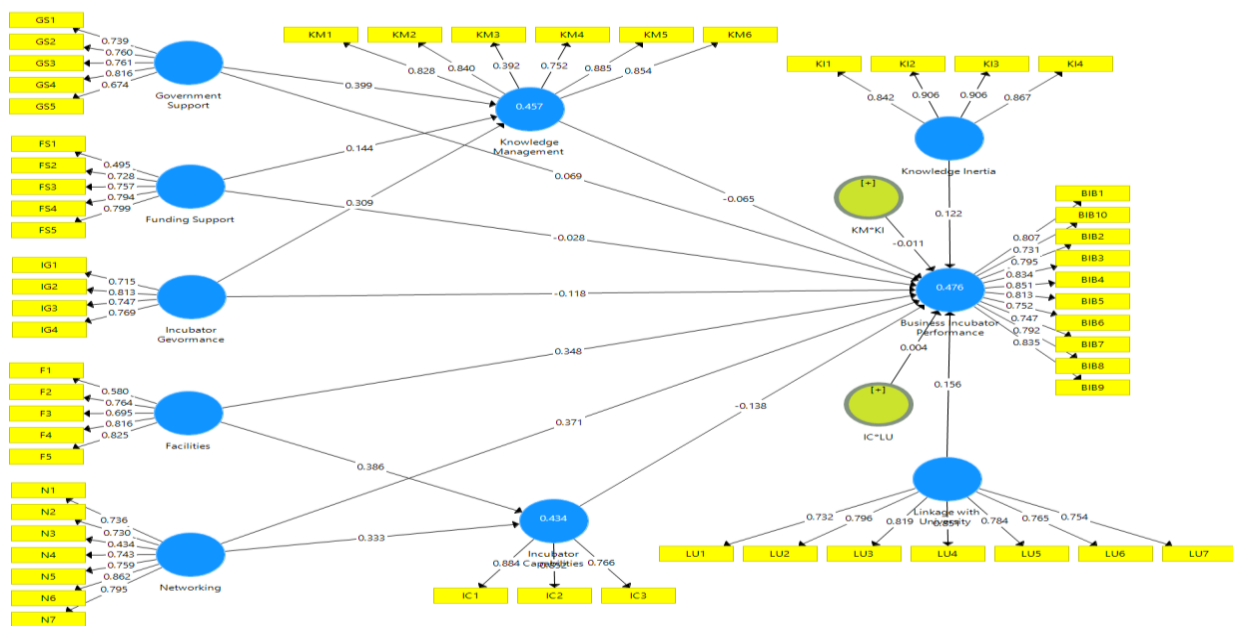
<b>constuct Code</b>	<b>Indicator</b>	<b>Outer Loading</b>	<b>CR</b>	<b>AVE</b>
FS	FS1	0.495	0.843	0.523
	FS2	0.728		
	FS3	0.757		
	FS4	0.794		
	FS5	0.799		
GS	GS1	0.739	0.866	0.565

<b>constuct Code</b>	<b>Indicator</b>	<b>Outer Loading</b>	<b>CR</b>	<b>AVE</b>
	GS2	0.760		
	GS3	0.761		
	GS4	0.816		
	GS5	0.674		
IG	IG1	0.715	0.847	0.580
	IG2	0.813		
	IG3	0.747		
	IG4	0.769		
LU	LU1	0.732	0.919	0.619
	LU2	0.796		
	LU3	0.819		
	LU4	0.851		
	LU5	0.784		
	LU6	0.765		
	LU7	0.754		
F	F1	0.580	0.858	0.550
	F2	0.764		
	F3	0.695		
	F4	0.816		
	F5	0.825		
N	N1	0.736	0.888	0.538
	N2	0.730		
	N3	0.434		
	N4	0.743		
	N5	0.759		
	N6	0.862		
	N7	0.795		
IC	IC1	0.884	0.874	0.698
	IC2	0.852		
	IC3	0.766		
KM	KM1	0.828	0.897	0.604
	KM2	0.840		
	KM3	0.392		
	KM4	0.752		
	KM5	0.885		
	KM6	0.854		
KI	KI1	0.842	0.932	0.775
	KI2	0.906		
	KI3	0.906		
	KI4	0.867		
BIB	BIB1	0.807	0.945	0.635
	BIB2	0.795		
	BIB3	0.834		



constuct Code	Indicator	Outer Loading	CR	AVE
	BIB4	0.851		
	BIB5	0.813		
	BIB6	0.752		
	BIB7	0.747		
	BIB8	0.792		
	BIB9	0.835		
	BIB10	0.731		

The standard loading value used is 0.50. Therefore, if there is an outer loading value that is smaller than 0.5, the indicator must be eliminated and considered invalid. Furthermore, after making the elimination, the model must be retested. There are three indicators that have a value below 0.50, namely in the funding support factor variable with indicator FS1 with a loading value of 0.495, the knowledge management factor variable with indicator KM3 with a loading value of 0.392 and the networking factor variable with indicator N3 with a loading value of 0.434. The Convergent Validity value can be seen in Figure 1 below



**Figure 1.** Outer Loading and AVE values before elimination of indicator

Then retesting is carried out by eliminating indicators that have loading factors and AVE less than 0.5. testing is repeated if there are still loading factor and AVE values that are below 0.5. the results of the retest can be seen in the following table

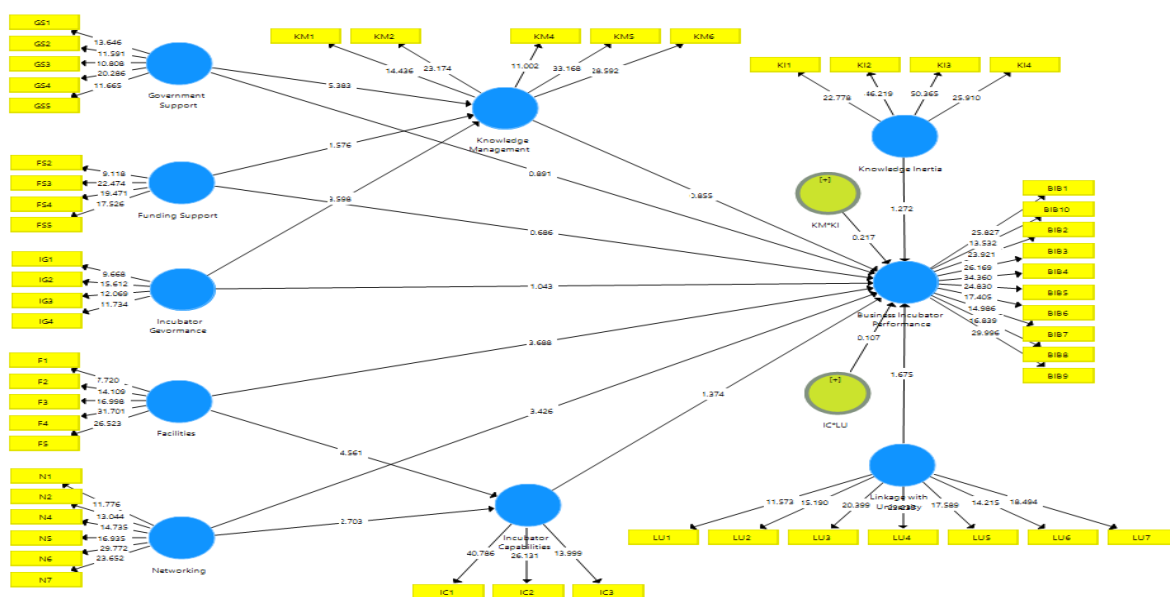
**Table 6.** Summary of outer loading, CR and AVE of constructs and indicators after adjustment.

Constuct Code	Indicator	Outer Loading	CR	AVE
FS	FS2	0.728	0.871	0.627
	FS3	0.757		
	FS4	0.794		
	FS5	0.799		
GS	GS1	0.739	0.866	0.565

<b>Constuct Code</b>	<b>Indicator</b>	<b>Outer Loading</b>	<b>CR</b>	<b>AVE</b>
	GS2	0.760		
	GS3	0.761		
	GS4	0.816		
	GS5	0.674		
IG	IG1	0.715	0.759	0.762
	IG2	0.813		
	IG3	0.747		
	IG4	0.769		
LU	LU1	0.732	0.919	0.619
	LU2	0.796		
	LU3	0.819		
	LU4	0.851		
	LU5	0.784		
	LU6	0.765		
	LU7	0.754		
F	F1	0.580	0.858	0.550
	F2	0.764		
	F3	0.695		
	F4	0.816		
	F5	0.825		
N	N1	0.736	0.902	0.606
	N2	0.730		
	N4	0.743		
	N5	0.759		
	N6	0.862		
	N7	0.795		
	IC	IC1		
IC2		0.852		
IC3		0.766		
KM	KM1	0.828	0.923	0.706
	KM2	0.840		
	KM4	0.752		
	KM5	0.885		
KI	KM6	0.854	0.932	0.775
	KI1	0.842		
	KI2	0.906		
	KI3	0.906		
BIB	KI4	0.867	0.945	0.635
	BIB1	0.807		
	BIB2	0.795		
	BIB3	0.834		
	BIB4	0.851		

Constuct Code	Indicator	Outer Loading	CR	AVE
	BIB5	0.813		
	BIB6	0.752		
	BIB7	0.747		
	BIB8	0.792		
	BIB9	0.835		
	BIB10	0.731		

Table 2 shows, loading factor, CR and AVE output. It can be observed that all loading factors are within the range of 0.4 to 0.7. In addition, the CR values are greater than 0.6. The smallest CR is Incubator Governance which is 0.847, much higher than the minimum limit of 0.6. All AVE values are greater than 0.5 and smaller than CR. The smallest AVE value is Facilities with a value of 0.550; slightly greater than the minimum limit of 0.5. All AVEs are in the range 0.5 - 1 while all CRs are in the range 0.8 - 1.0. This shows that all AVEs are smaller than CRs. It can be concluded that the model has met the requirements of convergent validity.



**Figure 2.** Outer Loading and AVE values after elimination of indicator

The assessment of the discriminant validity of the scale was measured using the HTMT criterion. Although previous studies have considered the cross-loading value and the Fornell-Larcker criterion to identify the discriminant validity of the scale, it seems that both criteria are not effective in identifying most items that have low discriminant validity. Therefore, researchers recommend evaluating the HTMT criterion as the primary assessment of the discriminant validity of a structured model [27]. In the context of reflective measurement models, discriminant validity can be considered met if the HTMT value for each construct does not exceed the 0.9 level [27].

**Table 7.** HTMT criterion

Variable	BIB	F	FS	GS	IC	IG	KI	KM	LU	N
<b>BIB</b>	0.669									
<b>F</b>	0.437	0.807								

<b>Variable</b>	<b>BIB</b>	<b>F</b>	<b>FS</b>	<b>GS</b>	<b>IC</b>	<b>IG</b>	<b>KI</b>	<b>KM</b>	<b>LU</b>	<b>N</b>
<b>FS</b>	0.450	0.580	0.498							
<b>GS</b>	0.343	0.384	0.448	0.529						
<b>IC</b>	0.398	0.727	0.618	0.429	0.639					
<b>IG</b>	0.324	0.377	0.413	0.438	0.381	0.409				
<b>KI</b>	0.451	0.631	0.491	0.662	0.740	0.576	0.670			
<b>KM</b>	0.514	0.575	0.596	0.665	0.766	0.560	0.605	0.674		
<b>LU</b>	0.677	0.784	0.582	0.591	0.696	0.643	0.746	0.732	0.714	
<b>N</b>	0.623	0.671	0.504	0.500	0.581	0.528	0.660	0.645	0.638	0.779

Table 7 illustrates the HTMT criteria among the constructs within the structured model utilized in this study. The presented HTMT values in the table are those falling below 0.9. Upon examination of the HTMT values, it is evident that all values remain below the maximum acceptable threshold, with the highest HTMT value recorded at 0.807 (Facilities). Moreover, the HTMT confidence intervals are provided within brackets. These intervals have been subjected to corrected and accelerated adjustments. Notably, in Table 7, none of the displayed confidence interval values encompass the value "1". The presence of "1" within the confidence intervals indicates inadequate discriminant validity of the respective item [24]. The assessment conducted via the HTMT criterion in this pilot study underscores the robust discriminant validity of the scales employed in this research.

### 3.2 Discussion

In-depth descriptive statistical analysis of the data we obtained from respondent profiles. This analysis aims to provide a deeper understanding of the characteristics and variations that exist within the respondent group, with a focus on key variables such as position, gender, incubator ownership, and age. We will describe a number of statistical parameters which include mean (average), median (middle value), minimum value, maximum value, standard deviation, and coefficient of variation. Standard Deviation is a statistical measure that measures the extent to which data is spread out or spread out from the mean. By calculating standard deviation, we can measure the degree of variation or heterogeneity of data within a group of respondents. A higher standard deviation value indicates that the data tends to be more spread out than the average, while a lower value indicates that the data tends to be closer to the average [25]. The Coefficient of Variation (CV) is a standard ratio deviation from the mean, which is used to measure the degree of variation relative to the scale of the data. The coefficient of variation allows comparison between data variations in different groups or variables that have different units of measure. The lower the coefficient of variation value, the more homogeneous or uniform the data in the group [25]. The results of this descriptive statistical analysis are explained in Table 4.

The convergent validity of the reflexive index model is calculated based on item/section scores and construct scores estimated using PLS. A measure of reflexivity is considered strong if its value is greater than 0.70 relative to the construct being measured. However, in the initial stages of the study, estimated loading values between 0.5-0.60 can be considered sufficient progress [24]. Convergent Validity Analysis, which aims to measure the extent to which the indicators used in the same construct or factor have an adequate level of relationship. Convergent validity analysis will consider the results of factor loading indicators on relevant factors, as well as measuring convergent validity based on Composite Reliability (CR) and AVE values.

The results of the convergent validity analysis can be seen that the AVE value of AVE is considered valid if the value is equal to or greater than 0.50, the value of each variable is greater than 0.50. The min AVE value is found in the facility variable with a value of 0.550 and the value AVE

max is found in the Moderating Effect 1 and Moderating Effect 2 variables with a value of 1,000 in the moderation convergent validity value which can be seen in Table 5, while the mediation convergent validity analysis value, the value of each variable obtained is greater than 0.50. The AVE min value is found in the facility variable with a value of 0.550 and the AVE max value is found in the knowledge management variable in the mediation convergent validity value which can be seen in Table 5.

The discriminant validity of the reflexive indicator measurement model depends on cross-loading with other constructs. If the measured construct has a greater loading value compared to other constructs in the model, this indicates that the latent construct better predicts its own block size compared to other block sizes. Apart from that, discriminant validity is also considered through the Fornell-Larcker correlation criterion, namely the square root value of the AVE of each construct must be greater than the correlation value between that construct and other constructs in the model to be said to have good discriminant validity. The parameter is used to evaluate whether the indicators of the latent variable/construct have good or non-discriminant validity. If the HTMT value is  $<0.9$ , it can be concluded that the variable has strong discriminant validity [24]. In Table 7 for the discriminant validity it can be seen that the HTMT values are all below 0.90 and can be said to be good.

This Reliability Test was carried out to ensure the consistency of the data collected through the questionnaire in the research. Reliability testing was carried out by checking the results of Cronbach's Alpha and Composite Reliability. The reliability value is considered good if the Composite Reliability exceeds 0.7. This reliability assessment is also strengthened by looking at the expected Cronbach's Alpha value of more than 0.7. The results of the mediation and moderation reliability tests can be seen in Table 4 showing that the composite reliability value is above 0.70 and the Cronbach's Alpha value exceeds 0.70. So, it can be concluded that all the variables used in this research are reliable.

#### **4. Conclusion**

Based on trials from 168 respondents and descriptive statistical analysis was carried out and continued with a questionnaire test using the SEM method with two stages of convergent validity test and discriminant validity of questionnaire variables to measure the performance of the Technology Business Incubator which is said to be valid because the value is above 0.5 as well as the results of each variable tested with the discriminant validity test via the HTMT parameter used to evaluate whether the indicators of the latent variable/construct have good or non-discriminant validity. If the HTMT value is  $<0.9$ , it can be concluded that the variable has strong discriminant validity (valid). In the mediation and moderation reliability test, all variables were said to be reliable because the composite reliability value was above 0.70 and the Cronbach's Alpha value exceeded 0.70. The results of the validity and reliability trials of the variables have proven that the research variables meet the criteria for use in measuring the performance of the Technology Business Incubator in Indonesia.

#### **References**

- [1] H. A. Mumtaha and H. A. Khoiri, "Analisis Dampak Perkembangan Revolusi Industri 4.0 dan Society 5.0 Pada Perilaku Masyarakat Ekonomi (E-Commerce)," *J. PILAR Teknol. J. Ilm. Ilmu Ilmu Tek.*, vol. 4, no. 2, 2019, doi: 10.33319/piltek.v4i2.39.
- [2] D. J. Teece, "Business Models, Business Strategy and Innovation," *Long Range Plann.*, vol. 43, no. 2–3, pp. 172–194, 2010.
- [3] Jurnas.com, "99 Persen Startup Indonesia Berakhir Gagal," <https://www.jurnas.com/artikel/48132/99-Persen-Startup-Indonesia-Berakhir-Gagal/>, 2019. .
- [4] R. Smilor, "Commercializing Technology Through New Business Incubators," *Res. Manage.*, vol. 30, 2009, doi: 10.1080/00345334.1987.11757061.
- [5] D. Rooney, G. Hearn, and T. Kastelle, "Knowledge is people doing things, knowledge economies are people doing things with better outcomes for more people," in *Handbook on the Knowledge Economy, Volume Two*, 2012.
- [6] R. Kiran and S. C. Bose, "Stimulating business incubation performance: role of networking, university linkage and facilities," *Technol. Anal. Strateg. Manag.*, vol. 32, no. 12, 2020, doi:

- 10.1080/09537325.2020.1772967.
- [7] V. Pereira and U. Bamel, “Extending the resource and knowledge based view: A critical analysis into its theoretical evolution and future research directions,” *J. Bus. Res.*, vol. 132, 2021, doi: 10.1016/j.jbusres.2021.04.021.
- [8] J. Barney, M. Wright, and D. J. Ketchen, “The resource-based view of the firm: Ten years after 1991,” *J. Manage.*, vol. 27, no. 6, pp. 625–641, 2001, doi: [https://doi.org/10.1016/S0149-2063\(01\)00114-3](https://doi.org/10.1016/S0149-2063(01)00114-3).
- [9] Y. J. Park, L.-C. Chang, J. F. Liang, C. Moon, C.-P. Chung, and V. C. Yang, “Nontoxic membrane translocation peptide from protamine, low molecular weight protamine (LMWP), for enhanced intracellular protein delivery: in vitro and in vivo study.,” *FASEB J. Off. Publ. Fed. Am. Soc. Exp. Biol.*, vol. 19, no. 11, pp. 1555–1557, Sep. 2005, doi: 10.1096/fj.04-2322fje.
- [10] C. Eveleens, F. Van Rijnsoever, and E. Niesten, “How network-based incubation helps start-up performance: a systematic review against the background of management theories,” *J. Technol. Transf.*, vol. 42, 2017, doi: 10.1007/s10961-016-9510-7.
- [11] O. Alpenidze, A. M. Pauceanu, and S. Sanyal, “Key success factors for business incubators in Europe: An empirical study,” *Acad. Entrep. J.*, vol. 25, no. 1, 2019.
- [12] R. Goplakrishnan and D. Ravindran, “An empirical study on service quality perceptions and continuance intention in mobile banking context in India,” *J. Internet Bank. Commer.*, vol. 17, 2012.
- [13] R. Lalkaka, “Technology business incubators to help build an innovation-based economy,” *J. Chang. Manag.*, vol. 3, no. 2, 2002, doi: 10.1080/714042533.
- [14] F. J. Islamy, R. Andriani, and R. Nurjaman, “Knowledge Based View: Pengaruh Knowledge Management Terhadap Kinerja Perguruan Tinggi Pada Masa Pandemi COVID-19,” *Idarah J. Manaj. Pendidik.*, vol. 5, no. 2, 2021, doi: 10.24252/idaarah.v5i2.22274.
- [15] S. Chen, X. Chen, Q. Cheng, and T. Shevlin, “Are family firms more tax aggressive than non-family firms?,” *J. financ. econ.*, vol. 95, no. 1, 2010, doi: 10.1016/j.jfineco.2009.02.003.
- [16] M. Soeryo Prayogo, U. Suhud, and A. Wahyu Handaru, “Assessing Startup Performance: ‘Case Study at National Business Incubator,’” *Int. J. Adv. Sci. Educ. Relig.*, vol. 2, no. 3, 2019, doi: 10.33648/ijoaser.v2i3.40.
- [17] S. C. Michael and J. A. Pearce, “The need for innovation as a rationale for government involvement in entrepreneurship,” *Entrep. Reg. Dev.*, vol. 21, no. 3, 2009, doi: 10.1080/08985620802279999.
- [18] V. L. Mfy, S. M. Ahammad, B. Nahar, and S. A. A. Khan, “International Journal of Science and Business A comparative Analysis on Wage Rate & Living Standard of Workers between,” 2019, doi: 10.5281/zenodo.2632972.
- [19] V. R. Wulan and A. Hermanto, “Sociopreneurship Business Incubator Design Based On Information Technology As an Innovative Solution for Enhancing Community Welfare,” *IJEBD (International J. Entrep. Bus. Dev.)*, vol. 2, no. 2, 2019, doi: 10.29138/ijebd.v2i2.749.
- [20] Baumassepe, “Sinergi Demi Inkubator Bisnis,” *Majalah Marketeers*, pp. 34–35, 2018.
- [21] S. Liao, W.-C. Fei, and C.-T. Liu, “Relationships between knowledge inertia, organizational learning and organization innovation,” *Technovation*, vol. 28, no. 4, pp. 183–195, 2008, doi: <https://doi.org/10.1016/j.technovation.2007.11.005>.
- [22] T. Teofilus, E. Ardyan, T. F. C. W. Sutrisno, S. Sabar, and V. Sutanto, “Managing Organizational Inertia: Indonesian Family Business Perspective,” *Front. Psychol.*, vol. 13, 2022, doi: 10.3389/fpsyg.2022.839266.
- [23] J. Henseler, C. M. Ringle, and M. Sarstedt, “A New Criterion For Assessing Discriminant Validity In Variance-Based Structural Equation Modeling,” *J. Acad. Mark. Sci.*, vol. 43, pp. 115–135.
- [24] J. . Hair, G. T. . Hult, C. . Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd Edition. Sage Publications Inc., Thousand Oaks, CA., 2017.
- [25] J. Joseph F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *Partial least squares structural equation modeling (PLS-SEM)*. 2014.

- [26] J. Hair, G. Hult, C. Ringle, and M. Sarstedt, *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Springer Nature, 2021.
- [27] J. Henseler, C. M. Ringle, and M. Sarstedt, “A New Criterion For Assessing Discriminant Validity In Variance-Based Structural Equation Modeling,” *J. Acad. Mark. Sci.*, vol. 43, pp. 115–135, 2015.