University Third Mission and the Antecedents: A Survey From Indonesian Higher Education

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The university's third mission is to answer the demands of the government, industry, and society so that universities become more independent as institutions but still beneficial for society simultaneously, especially in supporting national competitiveness. This study's purposes are to determine the factors determining the success of implementing the university's third mission to support sustainable regional socio-economic development and to test the relationship between the antecedents of the university's 3rd mission. This study confirmed that the university's 3rd mission performance could be significantly influenced by the practice of an entrepreneurial university simultaneously aligning with SDG-oriented higher education.

Keywords: higher education, entrepreneurial university, sustainability development goals, third mission, commercialization and technology transfer

INTRODUCTION

After focusing on carrying out its two main missions as a provider of educational services and creator of scientific knowledge through research activities, in the last quarter century, universities are faced their third mission namely the commercialization of research results and technology transfer. The university's third mission is to answer the demands of the government, industry, and society so that universities become more independent as institutions. However, they can still benefit society simultaneously, especially in supporting business innovation and increasing national competitiveness through socio-economic development. Over time, this third mission has become a debate about the social impact of higher education and the meaning of a college (Zomer & Benneworth, 2011). Third mission activities such as knowledge transfer, licenses, patents, university spin-offs, and many others have received much attention from academics and policymakers because of their direct and measurable economic impact (Mowery & Shane, 2002). Many things can be done to increase the effectiveness of technology transfer, and most importantly, university technology transfer should be considered from a strategic perspective (Siegel & Phan, 2005).

Institutions that choose to emphasize the entrepreneurial dimension of technology transfer will need to address skills shortages in technology transfer offices, inconsistent reward systems towards increased entrepreneurial activity, and education/training for faculty members, students, especially postgraduate students, and interactions with employers (Siegel & Phan, 2005). University's business schools can also address skills and education shortages through targeted program delivery to technology licensure officers and campus community members who wish to launch startups (Siegel & Phan, 2005).

Entrepreneurial university means a university that effectively carries out the commercialization and transfer of technology/knowledge in various forms of service/product/process innovation as an effort to support regional social and economic growth (Budyldina, 2018; Duke, 2009; Etzkowitz & Dzisah, 2008; Etzkowitz & Leydesdorff, 2000; Zomer & Benneworth, 2011). The main characteristics of an entrepreneurial university are (1) actively seeking resources from various external sources to promote university development; (2) participating in economic and social development in the region, where both of these can be achieved through commercialization and transfer of knowledge/technology (Etzkowitz & Dzisah, 2008). The four main criteria driving entrepreneurial university are (1) research quality; (2) a broad network; (3) diversification of sources of income; (4) creating entrepreneurial capital or manifesting entrepreneurial mission in official university documents and active promotion of entrepreneurial initiatives in the region (Budyldina, 2018). Previous research confirms the direction of the development of this university's mission towards the meaningfulness of a university. Higher education institutions are not just learning institutions but also desirable organizations for knowledge acquisition, transfer, and exchange because they can give birth to knowledge workers, innovators, and social entrepreneurs in innovation networks (S Halibas, Ocier Sibayan, & Lyn Maata, 2017). Furthermore, other research shows that academics are quite involved in entrepreneurial activities in Portugal, which is very influential in applying research to real problems. It is also found that academics involved in the technology process transfer their attention not only focused on research activities but also on service to the outside community as a concrete manifestation of the results of their research (Sá, Dias, & Sá, 2018).

Concerning sustainability challenges, entrepreneurship moves into sustainable entrepreneurship focused on conserving nature, supporting life, and society in pursuing opportunities to present future products, processes, and services to gain economic and non-economic benefits to individuals, the economy, and society (Shepherd & Patzelt, 2011), as well as being proactive about future trends and business opportunities, is the essence of sustainable entrepreneurship (Weidinger, Fischler, & Schmidpeter, 2014). One study concluded that sustainable entrepreneurial culture programs in the public education system positively impacted students' attitudes toward their social responsibility for a better future (Sánchez-Hernández & Maldonado-Briegas, 2019). Other findings state that sustainable entrepreneurship contributes to solving social and environmental problems by realizing successful businesses using economic goals, and triggering the integration of sustainable development goals into organizational goal-setting and processes (Muñoz & Cohen, 2018). In connection with the challenge of sustainability and university entrepreneurship, a global perspective confirms: 1) higher education institutions are the key to implementing the principles of sustainability; 2) a curriculum based on sustainability and cultural change is the key to transforming the SDGs mindset; 3) interdisciplinary studies are the foundation of the transformation towards sustainability; 4) the political environment and the interests of higher education stakeholders affect the implementation of sustainability (Žalėnienė & Pereira, 2021). Researchers have begun investigating universities' role and contribution to adopting the SDGs in the last five years. Although many academics agree with the strategic role covered by universities in achieving the SDGs (Gusmão Caiado, Leal Filho, Quelhas, Luiz de Mattos Nascimento, & Ávila, 2018), they still underline the specific needs that are a priority in their departments in their implementation (Caputo, Ligorio, & Pizzi, 2021).

Based on the literature review, the authors formulated this research problem (RP): "How has the university transformed to facilitate the implementation of its third mission in supporting regional socio-economic development?". Accordance to that RP, this study's research questions (RQ) are as follows: (1) RQ1- What are the characteristics of an entrepreneurial university that support the third mission of higher education? (2) RQ2-What factors characterize an SDG-oriented higher education that supports the higher education facing the sustainability issue? (3) RQ3-How is the relationship between entrepreneurship

universities and SDG-oriented higher education on the university's third mission supporting regional socio-economic development? In the end, this study aims to determine the factors determining the success of implementing the university's third mission to support regional socio-economic development.

METHODS

This research used a quantitative approach, and the nature of research was exploratory quantitative research. The object of research were entrepreneurial university (EU), sustainable development goal-oriented higher education (SDG-HE), and the performance of the university third mission (3CTT). Data collection used a non-probability sampling technique with voluntary response design. Sampling was conducted at higher educations in Java and Sumatera Islands, Indonesia, considering that 80% of higher education in Indonesia is spread across those two islands mentioned. Data was collected through a survey from June 2022 to September 2022 using an online questionnaire created on Google Forms. The questionnaire has been tested at the pilot study. After it was declared valid and reliable, the questionnaire was disseminated by sending URL links through institution email to the faculty members as the respondents. Questionnaires measure three variables: entrepreneurial university, SDG-oriented higher education, and the performance of the university third mission. At the end of the survey, 311 questionnaires were collected and filled in by faculty members as respondents. Then after going through the data screening process, 300 filled questionnaires were obtained, which were feasible to be used as research data. Data analysis using (1) descriptive analysis to present the descriptive and normality data, (2) using structural equation modelling analysis with software SmartPLS4 to answer the RQ1, RQ2, and RQ3. Table 1 presents the variable operationalization used in this study using Likert 5-points scale.

TABLE 1
VARIABLE OPERATIONALIZATION

Construct/ Code Item	Item
ENTREPRENEURIAL UNIVERSITY (EntUniv)	
EntUniv1	Incentives from institutions for entrepreneurial and innovative activities carried out by the civitas academia are well realized within the institutional environment (HEInnovate, 2021).
EntUniv2	Provisions of entrepreneurship and innovation infrastructure, such as the provision of business incubators, testing laboratories, research facilities, prototype support, IT services, and technology transfer offices, are well developed within the institution (HEInnovate, 2021).
EntUniv3	Digital transformation culture supporting the growth of innovation and entrepreneurship is built in a conducive environment within the institution (HEInnovate, 2021).
EntUniv4	Digital infrastructure to support entrepreneurship and innovation activities within institutions is well managed (HEInnovate, 2021).
EntUniv5	Digital capability development programs for staff, lecturers, and students are realized regularly (HEInnovate, 2021).
EntUniv6	Institutions facilitate lecturer research/publication activities with researchers/partners from abroad (Bezanilla, García-Olalla, Paños-Castro, & Arruti, 2020; HEInnovate, 2021).
EntUniv7	The institution socializes the procedures for developing extensive relationships with international research networks and innovation groups (Bezanilla et al., 2020; HEInnovate, 2021).
EntUniv8	The impactful research/publication collaboration culture is well-established within the institution (Bezanilla et al., 2020; HEInnovate, 2021).

EntUniv9	General policies related to commercialization and technology transfer to the civitas academia as a form of implementing the third mission in supporting regional social and economic growth are well campaigned (Siegel & Phan, 2005).
EntUniv10	Research and technology transfer office/RTTO with a clear organizational structure is already available within the institution (Siegel & Phan, 2005).
EntUniv11	Support for the involvement of the civitas academia in commercialization and technology transfer through a profitable royalty-sharing formula is well socialized by TTO (Siegel & Phan, 2005).
EntUniv12	Services from RTTO to provide intensive consultation for academics who will be involved in commercialization & well-socialized technology transfer in institutions (Siegel & Phan, 2005).
EntUniv13	Awards for technology transfer activities carried out by the civitas academia are given by including them as one of the promotion criteria (Siegel & Phan, 2005).
SDG-ORIENTED HIGHER EDUCATION (SDG-HE)	
SDG_HE1	The mobilization of students for activities that have an impact on social, economic, or the environment in my study program is carried out well (United Nations, 2015; Žalėnienė & Pereira, 2021).
SDG_HE2	Several teaching topics in the courses I teach have been integrated with the main focus of my Department/Faculty's SDGs (United Nations, 2015; Žalėnienė & Pereira, 2021).
SDG_HE3	Research/publication topics that are integrated with the main focus of my Department/Faculty's SDGs are well socialized (United Nations, 2015; Žalėnienė & Pereira, 2021).
SDG_HE4	Funding priorities for research/publication topics that are relevant to the main focus of the Department/Faculty's SDGs have been well realized (United Nations, 2015; Žalėnienė & Pereira, 2021).
SDG_HE5	The topics of community service that are integrated with the main focus of my Department/Faculty's SDGs have been well socialized (United Nations, 2015; Žalėnienė & Pereira, 2021).
SDG_HE6	Priority funding for scientific publications of community service activities that are relevant to the main focus of Department/Faculty SDGs has been well realized (United Nations, 2015; Žalėnienė & Pereira, 2021).
UNIVERSITY 3rd MISSION PERFORMANCE (3CTT)	
3CTT1	Teaching-research-community service activities, commercialization, and technology transfer mostly related to: sustainable social issues, such as healthy and prosperous life, education, gender equality, poverty/hunger (Muñoz & Cohen, 2018; Sá et al., 2018; Shepherd & Patzelt, 2011; Tilley & Young, 2009).
3CTT2	Teaching-research-community service activities, commercialization, and technology transfer mostly related to: sustainable economic issues, such as decent work, partnership, economic growth, industry, innovation, and infrastructure, responsible consumption and production (Muñoz & Cohen, 2018; Sá et al., 2018; Shepherd & Patzelt, 2011; Tilley & Young, 2009).
3CTT3	Teaching-research-community service activities, commercialization, and technology transfer mostly related to: sustainable environmental issues, such as clean water and proper sanitation, handling climate change, marine/land ecosystems, sustainable cities and settlements, responsible consumption and production. (Muñoz & Cohen, 2018; Sá et al., 2018; Shepherd & Patzelt, 2011; Tilley & Young, 2009).
3CTT4	University commercialized research findings that have a sustainable social, economic and/or environmental impact, through RTTO (Etzkowitz, 2008).

3CTT5	University provided institutional business incubator to commercialize student/alumni startups (Etzkowitz, 2008).
3CTT6	University facilitated startup fundraising through venture capital funding and others (Etzkowitz, 2008).
3CTT7	University facilitated an university spin-off program: namely research with ideas from the community/company, or vice versa the results of research from institutions for solutions in the community/company (Etzkowitz, 2008).

RESULTS AND DISCUSSION

Demographic Data Analysis

Table 2 presents the demographic profile of the respondents. No non-response bias occurred. The dominant percentage of assistant professors in this survey is under the reality that the percentage of assistant professors is the largest in Indonesia. Likewise, the percentage of educational level under the population of lecturers in Indonesian tertiary institutions, most of whom are at the highest level of master's education (Badan Pusat Statistik, 2022; Kemenristekdikti, 2018).

TABLE 2
DEMOGRAPHIC PROFILE OF RESPONDENTS

	Count	%
Gender		
female	139	46.33%
male	161	53.67%
Age		
< 35 years	80	26.67%
36-45 years	106	35.33%
46-55 years	73	24.33%
56-65 years	35	11.67%
> 65 years	6	2.00%
Working Period		
1-10 years	183	61.00%
11-20 years	74	24.67%
21-30 years	30	10.00%
>30 years	13	4.33%
Functional Position		
Lecture	43	14.33%
assistant professor	222	74.00%
associate professor	28	9.33%
full professor	7	2.33%
Education Level		
doctor	103	34.33%
magister	197	65.67%
Grand Total	**300**	**100.00%**

Descriptive and Measurement Model Analysis

Table 3 shows the descriptive and normality data, indicator reliability, internal consistency reliability, and convergent validity. Based on Table 3, the average responses to the EntUniv, SDG-HE, and 3CTTT, respectively, were 3.79 (σ=0.15), 3.71 (σ=0.03), and 3.41 (σ=0.42). After measuring the frequency distribution, the authors confirmed that the faculty members perceive the Indonesian entrepreneurial

university, SDG-oriented higher education, and the performance of the Indonesian university's third mission measured as "medium → high scale." In addition, Table 3 presents the normality data. Data will be declared normally distributed if it is in the range -2 ≤ skewness ≤ 2 and -7 ≤ kurtosis ≤ 7 (Curran, West, & Finch, 1996; West, Finch, & Curran, 1995). Based on this threshold, it is also confirmed that the collected data presented in table 3 is normally distributed because all the skewness and kurtosis values are in the normal range.

TABLE 3
DESCRIPTIVE AND DATA NORMALITY, CONVERGENT VALIDITY AND INTERNAL CONSISTENCY RELIABILITY

Construct/ Item Code	Mean	Standard deviation	Excess kurtosis	Skewness	Outer Loadings	Cr. α	rho_a	rho_c	AVE
Entrepreneurial University (EntUniv)									
EntUniv1	3.803	0.972	-0.278	-0.538	0.750	0.951	0.952	0.956	0.629
EntUniv2	3.977	0.918	-0.397	-0.577	0.743				
EntUniv3	4.010	0.900	-0.072	-0.654	0.749				
EntUniv4	3.937	0.894	-0.229	-0.578	0.809				
EntUniv5	3.967	0.923	-0.363	-0.598	0.738				
EntUniv6	3.717	1.124	-0.270	-0.699	0.808				
EntUniv7	3.667	1.078	-0.520	-0.477	0.810				
EntUniv8	3.937	0.890	0.462	-0.787	0.778				
EntUniv9	3.747	0.907	-0.131	-0.474	0.787				
EntUniv10	3.723	1.036	-0.025	-0.691	0.799				
EntUniv11	3.583	0.978	-0.256	-0.418	0.847				
EntUniv12	3.617	1.021	-0.180	-0.517	0.834				
EntUniv13	3.690	0.935	-0.292	-0.477	0.846				
SDG_oriented Higher Education (SDG-HE)									
SDG_HE1	3.763	0.913	0.091	-0.490	0.824	0.930	0.931	0.945	0.741
SDG_HE2	3.743	0.915	0.334	-0.623	0.824				
SDG_HE3	3.713	0.926	-0.140	-0.462	0.888				
SDG_HE4	3.687	0.998	-0.118	-0.534	0.871				
SDG_HE5	3.710	0.979	0.019	-0.547	0.879				
SDG_HE6	3.653	0.993	0.152	-0.573	0.877				
University 3rd Mission Performance (3CTT)									
3CTT1	3.937	0.875	0.039	-0.596	0.730	0.889	0.895	0.914	0.603
3CTT2	4.013	0.721	-0.765	-0.127	0.736				
3CTT3	2.807	0.888	-0.508	-0.413	0.699				
3CTT4	3.290	1.125	-0.451	-0.463	0.783				
3CTT5	3.297	1.126	-0.560	-0.421	0.773				
3CTT6	3.217	1.187	-0.731	-0.330	0.859				
3CTT7	3.300	1.085	-0.529	-0.383	0.841				

Note. AVE=Average Variance Extracted, Cr. α=Cronbach's alpha

To answer RQ1-What are the characteristics of an entrepreneurial university that supports the third mission of higher education? And RQ2-What factors characterize an SDG-oriented higher education that supports the higher education facing the sustainability issue? The authors carry out measurement model

measurements on the entrepreneurial university and SDG-oriented higher education variables, the results of which are presented in table 3 and table 4.

Furthermore, the authors analyze valid and reliable factors as manifests of an entrepreneurial university and SDG-oriented higher education using the rules of thumb as follows:

(1) Indicator reliability uses outer loading values (Joseph F. Hair, Hult, Ringle, & Sarstedt, 2017). If the outer loading value is <0.4, it is recommended that the indicator be removed. If the outer loading is 0.40-0.70, it can be considered deleted only if the removal increases composite reliability (CR) and average variance extracted (AVE). If outer loading> 0.7, it is declared to have excellent and acceptable indicator validity.

(2) Internal consistency reliability uses composite reliability (CR) (Joseph F. Hair et al., 2017). In quantitative research, CR>0.70 is considered acceptable. Also, consider Cronbach's alpha as the lower bound and CR as the upper bound for internal consistency reliability.

(3) Convergent validity uses average variance extracted (AVE) criteria (Joseph F. Hair et al., 2017). The AVE value is equivalent to the commonality of a construction. The AVE value≥0.50 indicates that the construct explains more than half of the indicator variance. AVE<0.50 indicates more item error than the variance explained by the construct. Suppose AVE<0.50; the item with the lowest outer loading for that construct must be removed.

(4) Discriminant validity (Joseph F. Hair et al., 2017), using: a) Heterotrait - Monotrait (HTMT) to assess discriminant validity in PLS-SEM. The confidence interval of the HTMT statistic may not include a value of 1 for all combinations of constructs. $HTMT_{0,85}$ (Zhang, Dawson, & Kline, 2021). HTMT values> 0.85 indicate a lack of discriminant validity. This threshold is used when the variables are conceptually different. $HTMT_{0,90}$ (Gold, Malhotra, & Segars, 2001). HTMT value> 0.90 indicates a lack of discriminant validity. This threshold is used when the variables are conceptually similar. b) Cross Loading, where the outer loading of a construct must be greater than the cross-loading with other constructs. c) Fornell-Larcker Criterion: the square root of the AVE of each construct must be higher than its highest correlation with other constructs.

TABLE 4
DISCRIMINANT VALIDITY: HTMT, FORNELL-LARCKER CRITERION

Heterotrait-Monotrait Ratio Statistics (HTMT)	3CTT	EntUniv	SDG-HE
3rd Mission Performance (3CTT)			
Entrepreneurial University (EntUniv)	0.760		
SDG_Oriented Higher Education (SDG-HE)	0.797	0.811	
Fornell and Larcker Criterion	**3CTT**	**EntUniv**	**SDG-HE**
3rd Mission Performance (3CTT)	0.776		
Entrepreneurial University (EntUniv)	0.705	0.793	
SDG_Oriented Higher Education (SDG-HE)	0.726	0.766	0.861

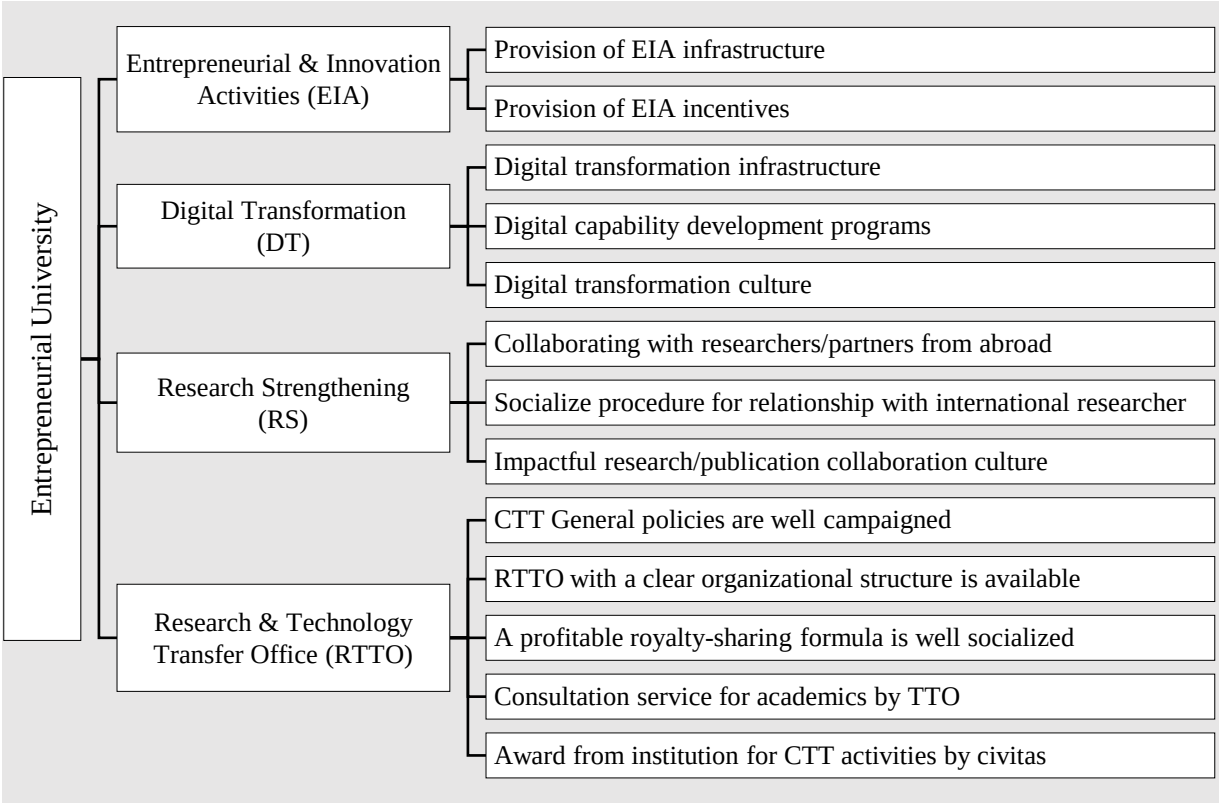
Note: Diagonal values (bolded) are square-root of AVE, off-diagonal values are correlation coefficients
HTMT value < 0.85 → $HTMT_{.85}$

After going through the measurement process above, the authors can conclude that the indicators presented in Tables 3 and 4 are proven to fulfill all thresholds of indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. These indicators can be stated as the main characteristics of an Indonesian entrepreneurial university to facilitate the implementation of the university's third mission and SDG-oriented Indonesia higher education in responding to challenging sustainability.

These findings answer the questions in RQ-1 and RQ-2. Figure 1 shows empirical evidence that confirms some of the characteristics of entrepreneurial universities in Indonesia in supporting the realization

of the university's 3rd mission as a complement to the first and second missions. It can be stated that entrepreneurial university carries out three main missions in supporting regional socio-economic development, namely as a provider of (1) educational services, (2) research, and (3) commercialization of research findings and transferring knowledge/technology.

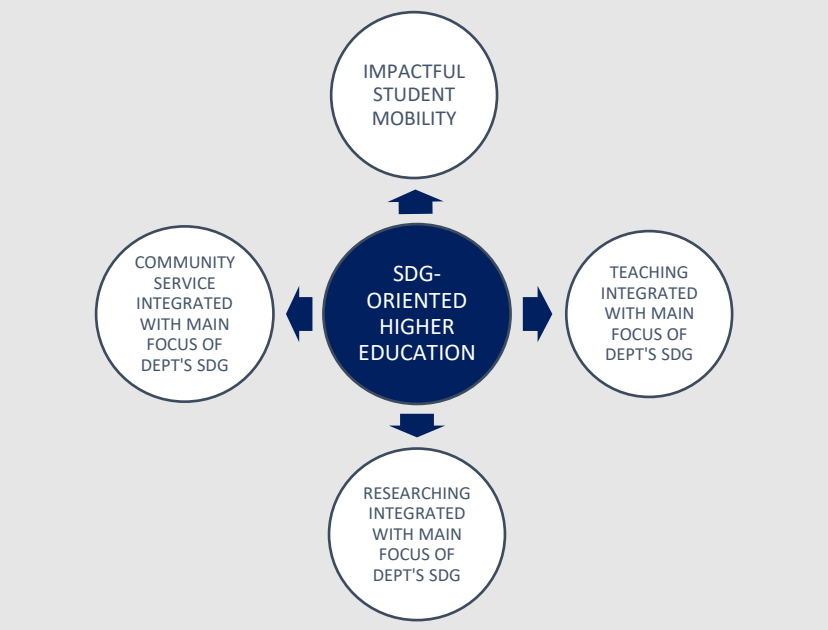
FIGURE 1
EMPIRICAL EVIDENCE OF INDONESIAN'S ENTREPRENEURIAL UNIVERSITY CHARACTERISTICS THAT SUPPORT TO THE THIRD MISSION



Note. CTTO=Commercialization & Transfer Technology

Figure 2 is another research finding that answers the RQ-2. What factors characterize an SDG-oriented higher education that supports higher education facing the sustainability issue? The author presents empirical findings that have been proven valid and reliable that higher education in Indonesia which has begun to respond to sustainability issues, has begun to adopt various sustainable development goals in educational activities, research and publication of research results, community service and publication of community service results, as well as in student mobilization activities towards activities that have an impact on social, economic life, and the preservation of the immediate environment.

FIGURE 2
EMPIRICAL EVIDENCE OF SDG-ORIENTED HIGHER EDUCATION CHARACTERISTICS IN INDONESIA RESPONDING TO THE SUSTAINABILITY ISSUE



Structural Model Analysis

Table 5 shows the result of structural model analysis using software SmartPLS4. To answer the RQ3- How is the relationship between entrepreneurship universities and SDG-oriented higher education on the university's third mission supporting regional socio-economic development? the author conducted the stages namely collinearity statistics testing, path analysis, deterministic coefficients measurement, and PLS Predict measurement.

Before carrying out the structural measurement analysis, the authors restate the hypotheses that have been compiled based on the literature review to direct the findings of the answers to the RQ3. Hypothesis RQ3-1: entrepreneurial university directly influences the university's 3rd mission. Hypothesis RQ3-2: SDGs-oriented higher education directly affects the university's 3rd mission. Then, the writer will test these hypotheses by referring to the results of the structural model in table 5 through the stages of collinearity statistics testing, path analysis, deterministic coefficients measurement, and PLS Predict measurement.

TABLE 5
STRUCTURAL MODEL ASSESSMENT

	Collinearity Statistics: Variance Inflation Factors (VIF)			3CTT
EntUniv				2.416
SDG-HE				2.416
	Path Coefficients	St. Dev.	t-stat	p- values
EntUniv -> 3CTT	0.359	0.071	5.029	0.000
SDG_HE -> 3CTT	0.451	0.072	6.277	0.000
	R-Square Adjusted	St. Dev.	t-stat	p-values
3CTT	0.578	0.039	14.970	0.000
	Q^2 PREDICT	PLS-SEM_RMSE	LM_RMSE	CONCLUSION
3CTT1	0.321	0.723	0.737	
3CTT2	0.319	0.597	0.631	High
3CTT3	0.280	0.757	0.783	Predictive
3CTT4	0.291	0.951	0.972	Power
3CTT5	0.291	0.952	0.968	
3CTT6	0.451	0.883	0.913	
3CTT7	0.434	0.819	0.860	

EntUniv=Entrepreneurial University; SDG-HE=SDG-oriented Higher Education.
3CTT=3rd Mission Performance, St. Dev: Standard Deviation.

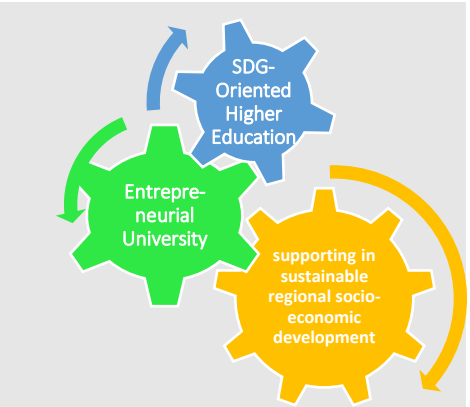
Collinearity is interpreted as the size of the correlation that occurs between two exogenous variables in a model. Empirically, if a high correlation is found between the model's exogenous variables, it is called collinearity. It proves that there are problems in research methodology that can have implications for errors in interpreting research results (J. F. J. Hair, Hult, Ringle, & Sarstedt, 2014). Furthermore, if this collinearity occurs in more than two exogenous variables, it is called multicollinearity. The rule of thumb relating to collinearity is the value of Variance Inflation Factors (VIF). The recommended VIF value < 10 to be said to be free from collinearity (Chin, 1998; Henseler, Ringle, C.M, & Sinkovics, 2009), while Hair et al. recommended a VIF value < 5 to be said to be free from collinearity (Joseph F. Hair, Ringle, & Sarstedt, 2011). Based on the Collinearity Statistics values in table 5, all VIF values are < 5, so it can be concluded that ***there is no collinearity in the model***.

In table 5, entrepreneurial university has a significant direct effect on 3CTT by 35.9%. It is evident from the t-statistic value of 5.029 (> 1.96) and a p-value of 0.000 (< 0.05). The results of this empirical evidence confirm that the more effectively a higher education institution carries out its "entrepreneurial" mission, the higher the variety of innovations carried out by the higher education institution → ***HRQ3-1 Supported.*** Based on table 5, it is significantly confirmed that SDGs-HE has a direct positive effect on 3CTT by 45.1%, with a t-statistic value of 6,277 (> 1.96) and a p-value of 0,000 (< 0.05). The results of this empirical evidence confirm that a university increasingly oriented towards SDGs, the greater the variety of innovations that can be carried out by the university → ***HRQ3-2 Supported***.

The results of this study, among others, are in line with the findings, which state that the entrepreneurial climate of the institution can strengthen the relationship between entrepreneurship education and a sustainable entrepreneurial mindset among students (Cui, 2021). Furthermore, another finding regarding providing intensive consultation for the academic community involved in the commercialization and transfer of technology/knowledge is in line with the prior study. Confirmed that good internal communication becomes a successful strategy in entrepreneurial university development because it straight connects to psychological factors of academics related to self-efficacy in developing entrepreneurial competencies (Seikkula-Leino & Salomaa, 2020).

PLS-SEM aims to maximize the endogenous variable R^2 in the path model. The accuracy of the prediction model can be evaluated through the value of R^2 as the combined effect of the exogenous variables on the endogenous variables. It means that the value of R^2 represents the amount of variance in the endogenous constructs that all related exogenous variables can explain. R^2 values range from 0 to 1, with higher levels indicating a higher degree of prediction accuracy. The rules of thumb that are used as a reference in measuring R^2 in this study are: (1) R^2 = 0.67; 0.33; and 0.19 indicates a strong, moderate, and weak model (Chin, 1998), (2) R^2= 0,75; 0,50; and 0,25 indicates a strong, moderate, and weak model, in marketing research (J. F. Hair, Ringle, & Sarstedt, 2011). Based on table 5, the value of R^2 in the latent variable 3CTT is 57.8%. ***The accuracy of this model is rated "medium to strong"*** (Chin, 1998), ***or "medium"*** (J. F. Hair et al., 2011).

FIGURE 3
ROLE OF HIGHER EDUCATION INSTITUTION IN SUPPORTING THE SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT



When research aims to predict models using PLS, researchers will need a measure of predictive ability (Joseph F. Hair et al., 2017). This measure is an indicator of an out-of-sample model's predictive power or relevance. When the PLS path model shows predictive relevance, it can accurately predict data not used in model estimation. In a structural model, the value of $Q^2>0$ for certain endogenous reflective latent variables will indicate the predictive relevance of the path model for certain dependent constructs. The following are instructions for measuring PLS Predict referring to the "Guidelines for interpreting PLS-predict results." (Shmueli et al., 2019). The instructions for measuring PLS Predict: The predicted value of Q^2 = 0 or less indicates no predictive power of the PLS-SEM analysis on that indicator. For indicators with $Q^2>0$ predictions, then compare the Root Mean Square Error (RMSE) or Mean Absolute Error (MAE) values with the Linear Model (LM) benchmark. This comparison can have four results:

(1) PLS-SEM < LM for none of the indicators. If the PLS-SEM analysis (compared to LM) results in lower prediction errors in terms of RMSE (or MAE) for neither indicator, this indicates that the model lacks predictive power.
(2) PLS-SEM < LM for a small number of indicators. Suppose a small part of the dependent construct indicator produces a lower PLS-SEM prediction error than the naive LM benchmark. In that case, this indicates that the model has low predictive power.
(3) PLS-SEM < LM for most indicators. If the majority (or the same number) of indicators in the PLS-SEM analysis produce a smaller prediction error than the LM, this indicates moderate predictive power.
(4) PLS-SEM < LM for all indicators. The model has high predictive power if all indicators in the PLS-SEM analysis have lower RMSE (or MAE) values than the nave LM benchmark.

The PLS-Predict analysis in table 5 refers to the Guidelines for interpreting PLS-predict results (Shmueli et al., 2019) as follows: (1) Q* values in all 3CTT indicators>0, meaning that all 3CTT indicators

have relevant predictive power. (2) All prediction errors are distributed symmetrically. It can be seen from the skewness values of all 3CTT indicators, which are in the range -2<skewness<2 (see Table 3) so that they are normally distributed, or the prediction errors are symmetrical. They can be continued by analyzing the model's predictive power using RMSE. (3) After comparing PLS-SEM_RMSE to LM_RMSE, the indicators 3CTT1 - 3CTT7 show the condition of PLS-SEM < LM. ***It means that the 3CTT construct has a high predictive model power.***

CONCLUSION

The characteristics of entrepreneurial universities in Indonesian confirmed through empirical evidence in this study are: (1) availability of entrepreneurship and innovation activities are well integrated into all departments, educators, and other centers within the institution (HEInnovate, 2021); (2) optimization of digital transformation and capability, reflected on availability of digital transformation infrastructure, capability development programs, and culture in supporting the growth of innovation and entrepreneurship; (3) intensively research and publication strengthening; and (4) realization availability of commercialization and technology transfer office (Siegel & Phan, 2005).

Furthermore, the characteristics of Indonesian higher institutions oriented towards achieving sustainable development goals, which are ensured to be valid and reliable in supporting the mission of the three universities to contribute to sustainable socio-economic development, is the integration of the SDGs agenda into every tri dharma activity. These include: 1) Integrating teaching topics with the focus of department/faculty SDGs. This study's results align with previous studies, which state that the alignment of curriculum development at the study program level with the SDGs is essential as an internal quality assurance standard (Stukalo & Lytvyn, 2021). 2) Integrate research/publication topics with the focus of department/faculty SDGs. 3) Priority for institutional funding for research/publication topics relevant to the focus of department/faculty SDGs. 4) Integrate community service topics with the focus of department/faculty SDGs. 5) Provision of priority institutional funding for scientific publications because of community service activities relevant to the main focus of department/faculty SDGs. 6) Deployment of student mobilization in activities that impact social, economic, or environmental balance.

Confirmed, University's 3rd mission performance could be significantly influenced by the practice of an entrepreneurial university aligning with SDG-oriented higher education. The interrelation of both variables could increase various performance of the university, among others, (1) in teaching-research-community service activities, commercialization, and technology transfer related to sustainable economic issues, such as partnership, economic growth, industry, innovation, and infrastructure, responsible consumption and production; sustainable social issues, such as healthy and prosperous life, education, gender equality, poverty/hunger; and sustainable environmental issues, such as clean water and proper sanitation, handling climate change, marine/land ecosystems, responsible consumption and production (Muñoz & Cohen, 2018; Sá et al., 2018; Shepherd & Patzelt, 2011; Tilley & Young, 2009). (2) Commercialized research findings that impact sustainable social, economic, and/or environmental through RTTO. (3) Startup fundraising through venture capital funding; and (4) university spin-off.

LIMITATION AND RECOMMENDATION

This research only includes higher education in the form of universities and institutes in undergraduate programs only. For future researchers, it is better to expand the research subject to other higher education in the form of polytechnics, academies, or to expand the scope of research to master or doctoral programs.

RESEARCH CONTRIBUTION

These research results were helpful for (1) universities that will transform into entrepreneurial universities and prepare to carry out the university's third mission, namely commercialization and technology transfer; (2) higher education, which will apply the principles of SDGs in creating a

sustainability culture within the institutional environment as a form of responsibility in creating successful next generations with sustainability insight; (3) provide information regarding the contribution of higher education institutions to regional socio-economic development through various promotion of innovations as the results of third mission performance in responding to challenges and the role of higher education in sustainability issues.

ACKNOWLEDGEMENTS

The author would like to thank: 1) Ministry of Education, Culture, Research, and Technology has funded the research and the APC, through DIPA Directorate of Research, Technology, and Community Service; Directorate General of Higher Education, Research, and Technology, with Research Contract for Fiscal Year 2022, No 410/LL3/AK.04/2022, June 17, 2022. 2) all leaders and colleagues at Binus University who have helped carry out this research, starting from submitting proposals to disseminating the results, 3) colleagues from several campuses who have participated in licensing and distribution of research instruments.

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