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Research Article

Intellectual Capital For Higher Education Competitiveness

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Abstract.
Just like those around the world, the higher education institutions in Indonesia also face the issues of accreditation, ranking, and requirements by the public and the government to participate in the improvement of community welfare through the implementation of research and community service for the society. Thus, the role of intellectual capital is very important in supporting higher education competitiveness. Based on a resource-based theory, this study aims to empirically examine the implications of an intellectual capital on higher education competitiveness. This study applies an explanatory design with a quantitative-descriptive-and causality analysis. We use secondary data sourced from public universities in Indonesia with at least "Good" institutionally accredited category, comprising in total of 74 universities. We apply the saturated sampling technique. The study concludes that a human capital has no significant effect on the competitiveness of higher education institutions. On the other hand, structural and relational capitals have a positive and significant effect on the competitiveness of universities. Thus, higher education management needs to provide stimuli and encouragement to the existing human resources to increase their capabilities. This research contributes to identifying the intellectual capital variables that affect the competitiveness of higher education institutions in Indonesia.

Keywords: human capital, structural capital, relational capital, higher education, competitiveness

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1. Introduction

Nowadays, higher education institutions (HEI) have been increasingly recognized for their roles in improving the economic growth of countries [1]. HEIs also form the societal transitions needed to adapt to very dynamic conditions [2]. This is inseparable from the roles of HEIs in developing such a human capital, which in turn will improve the national competitiveness [3].

Higher education organizations are among those facing the challenges of global competitiveness [4]; [5] and environmental dynamics. This has been triggered by globalization [6], international competition, financial pressures of diminishing availability of public funds [7]; [8], and political, economic, and social demands for higher educations

to keep improving [9]; [8]. Internal and external stakeholders are increasingly demanding for much better results in research, teaching, knowledge transfer, employability and community outreach [10]; [9]. Universities have also been competing for the best students, the most relevant and productive teaching staff and educators, partnership with selected companies, and resources to build attractive campuses and to produce and share relevant knowledge [9]. For this reason, HEIs need to continue strengthening their competitiveness [11] in order to survive, develop, and improve their services to the public.

To improve such a competitiveness, both tangible and intangible resources are required [12]; [13]. In the era of knowledge, intellectual capital is an intangible resource that plays an important role in achieving organizational competitive advantages. The classification of intellectual capitals has evolved over time [14]. However, most researchers agree that an intellectual capital consists of three elements: human capital, structural capital, and relational capital [15]; [16]; [17]; [40].

Several studies showed that the three elements of intellectual capital (human capital, structural capital, and relational capital) affect the competitive advantage [18]; [19] and organizational performance [20]; [21]. However, a research conducted by [22] found that there was no contribution of human capital to the organizational competitive advantage. Furthermore, a research conducted by [23] on manufacturing companies in Pakistan and China found that in general an intellectual capital had a significant effect on the competitive advantage, although the relational capital had no effect on the competitive advantage of companies in Pakistan. Meanwhile, the structural capital and relational capital did not significantly influence the competitive advantage of companies in China. Therefore, the relationship between a human capital, relational capital, and structural capital and the organizational performance and competitiveness are still debatable.

Studies on intellectual capital have been carried out in various contexts, both related to the performance and organizational competitiveness. However, most of these studies were carried out in the industrial world. Studies on the relationship between intellectual capital and the competitiveness of HEIs are still relatively limited, especially in developing countries. Thus, this study aims to analyze the contribution of an intellectual capital to the competitive advantage of higher education institutions in Indonesia.

2. Literature Review

This research is based on the resource-based theory of Barney [12]. This theory states that organizational resources play an important role in achieving the competitive advantage and superior organizational performance, especially intangible resources [12]. However, not all resources can achieve such a competitive advantage. Only those valuable, rare, imperfectly imitable and organized resources can be the sources of sustainable competitive advantage [24].

[25] define a sustainable competitive advantage as an organizational asset, feature, or capability that is difficult to imitate, and places the organization in a superior position in the long term in comparison to its competitors. Referring to the resource-based theory, a competitive advantage is achieved when an organization is able to manage its resources [26]. [27] stated that an organization had a competitive advantage if the organization could create a higher economic value in comparison to its competitors.

An organization's competitive advantage depends on its strategic resources and the implementation of strategies that create or add value to the organization [28]. These resources are used by organizations to develop, produce, and deliver products or services to their customers [24]. Organizational resources consist of tangible and intangible resources. Researchers agree that intangible resources play a greater role in generating an organization's competitive advantage.

One of the most important intangible resources in today's knowledge era is the intellectual capital. A research conducted by [29] found that an intellectual capital had the potential to create the competitive advantage and to improve the organizational performance [20]. Thus, an intellectual capital plays an important role in increasing the organizational competitiveness [30], creating value and achieving profits and high organizational performance [31].

An intellectual capital consists of three elements, namely human capital, structural/organizational capital, and relational capital [32]; [33]. [34], believe that a human capital is an important capital in creating an organization's competitive advantage. [23] and [35] stated that a human capital and a relational capital have a significant effect on the organizational competitive advantage. In contrast, a research conducted by [22] found that a human capital had no direct significant effect on the competitive advantage. Referring to the literature and previous researches, we have developed the first hypothesis as the following:

H1: A human capital has a positive and significant effect on the competitiveness of HEI.

A structural capital plays an important role in achieving the organizational performance and competitive advantage, through its routine procedures, vision, organizational mission, and infrastructure support [33]. Research conducted by [18] and [35] concluded that a structural capital had a positive and significant effect on the organizational competitive advantage. However, a research conducted by [23] found that a structural capital did not significantly affect companies in China. Thus the relationship between a structural capital and the competitive advantage is still debatable. Therefore, we have constructed the second hypothesis as the following:

H2: A structural capital has a positive and significant effect on the competitiveness of universities.

A relational capital plays a role in establishing the relationships with the parties outside the universities, such as the industrial and business world, the government, other universities, and other agencies. A research conducted by [36] found that relational abilities affect the organizational performance. The third hypothesis of this study is:

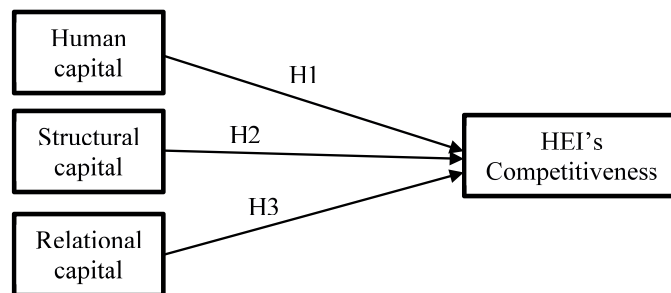H3: A relational capital has a positive and significant effect on the competitiveness of universities."

Figure 1: Hypothetical Framework.

3. Research Methods

This research is a quantitative- descriptive research with an explanatory approach. The research was conducted on some state academic universities in Indonesia that already had been institutionally accredited, in total 74 universities out of 76 existing academic state universities. So, the sampling applied a purposive technique. The data used are the quantitative ones and secondary in nature, sourced from the SINTA (Science and Technologi Index) website and Higher Education Statistics from the Higher Education Database of the Ministry of Education, Culture, Research and Technology. SINTA is a portal built by the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia containing the metrics of science and technology performance

that include among others the performance of researchers, writers, authors, the performance of institutions in Indonesia in publishing journals and in science and technology. The data collected were the secondary ones for 2019-2021. However, only the data on 66 universities that could be used to process and analyze because there were some missing data in 8 universities. Table 1 shows the operational definitions of the variables used in this study.

The instrument validity test was carried out using the Pearson's Product Moment. Meanwhile, the reliability test used Cronbach's alpha test [37]. The normality test was carried out using the Kolmogorov-Smirnov Test. To examine the construct independent variables, a factor analysis was used. The analysis was carried out using the multiple linear regression analysis techniques on the SPSS application.

From the normality test, the results show that accredited journal indicators on SC variables are not normally distributed (significance = 0.00), so they are not included for further data processing. Thus the SC variable is represented only by the number of accredited study programs. The competitiveness variable has citation indicators per lecturer and IPR per lecturer, while publication per lecturer indicator is not normally distributed.

Meanwhile, the validity test of all research instruments shows that all instruments/indicators are valid with r-count > r-table (0.2423). The r value of the instrument ranges from 0.509 to 0.795. The reliability test showed that all of the variables studied were adequate because the value of Cronbach's alpha was > 0.600. The Cronbach's alpha value for the HC variable is 0.646 (fairly reliable) and the Cronbach's alpha value for the RC variable is 0.776 that indicates that the instrument used is quite reliable.

4. Results and Discussion

4.1. Descriptive analysis

The number of samples of HEIs used for this study was 66 public academic HEIs with a minimum institutional accreditation rating of Good. A university with good accreditation means that the university has met the National Higher Education Standards. Meanwhile, a university that has an institutional accreditation rating above Good means that it has exceeded the National Higher Education Standards [38].

In 2023, 51.6% of state academic HEIs have an A or Superior accreditation rating. Only 3.0% of universities are still accredited Good. Thus, 97% of the academic state universities studied have exceeded the National Higher Education Standards.

TABLE 1: Operational Definition of The Variables.

Variable and Indicators	Definition	Notation	Data sources
Human Capital (HC)			
Lecturers based on their functional positions	The weighted percentage of lecturers based on their functional positions against to the total permanent lecturers	HC1	SINTA's (metric cluster)
Doctoral qualified lecturers	The percentage of lecturers with doctoral qualifications out of the total permanent lecturers	HC2	Higher Education Statistics Years 2019-2021
Postgraduate students	The percentage of Postgraduate students out of the total registered students	HC3	Higher Education Statistics Years 2019-2021
Structural Capital (SC)			
Accredited study program	The weighted percentage of accredited study programs out of the total study programs based on the accreditation rating	SC1	SINTA (metric cluster)
Accredited journal	The weighted percentage of SINTA accredited journals out of the total journals owned based on the SINTA's rating	SC2	SINTA (metric cluster)
Relational Capital (RC)			
Number of author collaborations	The number of collaborations between writers at universities and those at other universities in Indonesia	RC1	SINTA (metric cluster)
The amount of community service	The weighted number of community service activities based on the community service level (international, national, internal)	RC2	SINTA (metric cluster)
Competitiveness			
Citation per author	The ratio of the number of citations per university lecturer against the average number of citations per lecturer	COMP1	SINTA (metric cluster)
Lecturer intellectual property rights (IPR)	The ratio of the number of intellectual property rights per university lecturer against the average number of IPR per lecturer	COMP2	SINTA (metric cluster)
Publication per lecturer	The ratio of the number of publications per university lecturer against the average number of publications per lecturer	COMP3	SINTA (metric cluster)

Table 2 informs that the number of permanent lecturers with doctoral qualifications ranges from 2.80% to 69.80% out of the total permanent lecturers in the HEIs. Meanwhile, the study programs that have been accredited range from 43.53% to 95.90% out of the total study programs in the HEIs. The number of author collaborations between

other universities varies quite a bit, starting from only 2 collaborations up to 13,272 collaborations.

TABLE 2: Variable Descriptive Statistics Researched

Variable Indicators	N	Minimum	Maximum	Mean	Std. Deviation
(HC1)	66	0.580	2.376	1.736	0.343
(HC2)	66	0.028	0.698	0.290	0.1445
(SC1)	66	17.408	38.358	29.434	4.267
(RC1)	66	2	13,272	1,526.50	2,761.647
(RC2)	66	240	431,840	27,436.82	57,299.290
(COMP1)	66	0.043	5.989	1.034	1.058
(COMP2)	66	0.002	9.827	0.972	1.632
Valid N (listwise)	66				

Source: Results of data processing, 2023

4.2. Multiple linear regression analysis

A multiple linear regression analysis is used to see the relationship between the independent variables, namely the human capital (HC), structural capital (SC), and relational capital (RC), with the dependent variable, namely the university competitiveness. Table 3 shows the results of processing multiple linear regression data.

TABLE 3: Multiple Linear Regression Results.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.122	0.759		-2.795	0.007
	HC	0.139	0.115	0.136	1.214	0.229
	Accredited study programs (SC)	0.072	0.026	0.314	2.786	0.007
	RC	0.459	0.109	0.462	4.210	0.000

Source: Results of data processing, 2023

Based on the results of multiple linear regression analysis, the regression equation can be compiled as follows.

$$Y = -2.122 + 0.139X_1 + 0.072X_2 + 0.459X_3 + e$$

Y : Competitiveness

X_1 : Human Capital (HC)

X_2 : Accredited study programs (Structural Capital/SC)

X_3 : Relational Capital (RC)

Constant = 2.122. This means that if there is no change in the HC, SC, and RC variables, then the university's competitiveness level will remain at 2.122 units.

Regression coefficient:

The regression coefficient of the HC variable = 0.139. The regression coefficient of this variable is positive, which means that the relationship between HC and competitiveness is unidirectional. By further improving the quality of HC, universities will have a higher competitiveness, assuming that other variables are fixed.

Structural capital (represented by accredited study programs) regression coefficient = 0.072. The regression coefficient of this variable is positive, which means that the relationship between the SC and competitiveness is unidirectional. By increasing the quality of SC, universities will have a higher competitiveness, assuming that other variables are fixed.

Regression coefficient of RC = 0.459. The regression coefficient of this variable is positive, which means that the relationship between the RC and competitiveness is unidirectional. By increasing the quality of RC, universities will have higher competitiveness, assuming other variables are fixed.

4.3. Determination test

To explain how much the variability of one factor is caused by its relationship to another factor, we use coefficient of determination (R^2).

TABLE 4: Determination Test Results.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.828[a]	0.686	0.671	0.56188281	2.389
a. Predictors: (Constant), Relational Capital, Human Capital, accredited study programs					
b. Dependent Variable: Competitiveness					

Source: Results of data processing, 2023

Table 4 informs that the coefficient of determination (R^2) is 0.686, which means that the ability of the independent variables as a whole in explaining the dependent variable (competitiveness) is 68.6%. The remaining 31.4% is explained by other variables

not included in this study, such as their reputation [9], organizational culture, innovation [39], and others.

4.4. Hypothesis test

The following table shows the results of the F test.

Table 5: F Test Results.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.758	3	14.253	45.144	0.000^b
	Residual	19.574	62	0.316		
	Total	62.332	65			
a. Dependent Variable: Competitiveness						
b. Predictors: (Constant), Human Capital, accredited study programs, Relational Capital						

Source: Results of data processing, 2023

Table 5 shows that simultaneously all predictors are able to significantly predict the HEI's competitiveness, where the F test value is 45.144 with a significance level = 0.000. Thus the model used has been able to predict the dependent variable.

To test the hypothesis that has been built, the t test is used by comparing the t-count value with the t_{table} value and its significance value. With a significance level of 0.05 and df = 64, a t_{table} of 1,669 is obtained.

Table 3 above shows that the t_{count} value of the HC variable is 1.214 < t_{table} with a significance level of 0.229 > 0.05. This means that the HC variable does not significantly influence the competitiveness of HEI. Thus the first hypothesis is rejected.

Furthermore, the t_{count} value of the SC variable represented by accredited study programs is 2,786 > t_{table}, with a significance level of 0.007 < 0.05. Thus the second hypothesis which states that the SC has a positive and significant effect on the HEI's competitiveness is accepted.

5. Finding and Conclusion

This study aims to analyze the effect of intellectual capital which consists of human capital, structural capital, and relational capital on the competitiveness of state academic universities in Indonesia. The results of the analysis prove that a human capital has no significant effect on the competitiveness of universities. This implies that lecturers who have a doctoral education and functional positions alone are not enough to increase the

competitiveness of the HEIs. To achieve a competitive advantage requires valuable, rare, unique, and well-organized resources [12]. In this case, a lecturer excellence is required, for example to carry out researches, to publish writings especially in international journals, and to carry out service activities at other universities or in the business and industrial worlds. This finding is in line with the results of research conducted by [22] which found that a human capital does not significantly influence an organizational competitive advantage.

The results of the analysis also prove that a structural capital has a significant effect on the competitive advantage of HEIs in Indonesia. The study program accreditation rating that represents the structural capital variable significantly influences the competitiveness of HEIs, because such a study program accreditation should be the cumulative result of the study program performance, both in terms of governance, lecturers performance, and students performance. It is understood that the better the accreditation rating of a study program will have an impact on increasing the competitiveness of higher education institutions. The results of this study are in line with research conducted by [18] and [35].

This study also proves that a relational capital has a significant effect on the competitive advantage of HEI. In carrying out its mission in the form of providing education, research, and community service, HEIs should have a good relationship with the community, users of higher education outputs (the business and industrial world), the government, other institutions, and the society in general. The results of this study are in line with research conducted by [35].

6. Implications, Limitations, and Suggestions

Although the results of this study found that a human capital did not significantly influence a university competitiveness, in overall the model used was able to predict the dependent variable, namely the university competitiveness. In this study, it can be seen that a relational capital is the variable that has the most influence on increasing the competitiveness of the HEIs. This has the implication that HEI should continue to improve their capabilities in developing relationships with other organizations outside the HEIs and the general public, which will enhance their reputation and competitiveness. On the other hand, higher education management needs to provide stimuli and encouragement to the existing human resources to increase their capabilities, both in improving their abilities and skills so that they become superior human resources. The

availability of such superior lecturers will make a significant contribution in increasing the competitiveness of the HEIs.

This research contributes to identifying the intellectual capital variables that affect the competitiveness of higher education institutions in Indonesia. However, this study has limitations on variable indicators that tend to be research and publication fields. A future research can further develop the indicators of the variables studied which include the core servives of higher educations. The scope of research should also include researching vocational colleges and private universities.

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