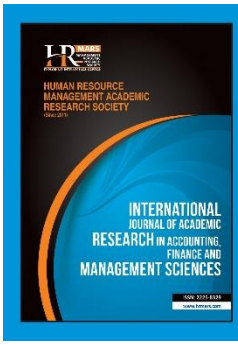

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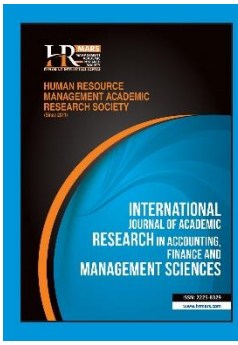
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Knowledge Asset Metrics in The Public University

Nur Quratun 'Aini Binti Haron[1], Amrizah Kamaluddin[2], Hazlina Hassan[3], Shukriah Sa'ad[4], Noradivah Hamzah[5], Pujiono[6]

[1,2,3,4]Universiti Teknologi MARA Cawangan Selangor Kampus Puncak Alam, [5]Universiti Kebangsaan Malaysia, [6]Universitas Negeri Surabaya

Corresponding Author's Email: amrizah@uitm.edu.my

Abstract

Higher education faces various challenges in sustaining its operations in the global business environment. In line with the resource-based view (RBV), higher education must use its resources, particularly its knowledge assets, to develop a competitive pursuit of university performance. This study aims to assess knowledge assets and their contribution to a university's performance. The respondent of the survey comprises academic administrators of Malaysian public universities. The findings indicate that most respondents believe their university supports all three knowledge assets: human capital, relational capital, and structural capital. Besides that, the respondents believed that their university's performance was well established on the four dimensions: finance, customer, internal process, and learning growth. This study offers a model to measure knowledge assets from the public university perspective. The study highlights the importance of knowledge assets towards public university performance which eventually supports leaders in strategizing these resources to enhance the efficiency of public university management.

Keywords: Knowledge Asset, Intellectual Capital, Human Capital, Structural Capital, Relational Capital, University performance

Introduction

In this modern era, the higher education sector faces various challenges. With the knowledge-based view (KBV), knowledge development was seen as one of the most valuable resources (Lentjusenkova & Inga, 2016). This industry has seen the introduction of numerous different kinds of knowledge assets. Since knowledge is universities' primary output and input, the intellectual capital approach has gained significant relevance. Researchers, managers, and students make up most of its valuable resource inputs. These individuals work with the University's procedures, rules, regulations, and network of relationships. Its main output is knowledge, which includes research findings, publications, educated students, and effective relationships with stakeholders. To maintain the high-quality university services and secure their future, these knowledge asset components need to be adequately identified and managed (Chatterji & Kiran, 2022).

Literature Review

Intellectual Capital

Intellectual capital is an intangible asset of an organisation that combines with human capital, relational capital, and structural capital to produce organizational value. Knowledge, intellectual capital and "intangible assets" are often used interchangeably. The term "intangible asset" is used in accounting literature, whereas "knowledge assets" is more frequently used by economists, and intellectual capital (IC) is occasionally used in management literature. Nevertheless, all three terms refer to the same thing, namely intangible assets or values like staff management, stakeholder relations, employee relations, and user/ customer relationships (Sadalia & Lubis, 2015).

The intangible asset consists of production components that help the business achieve long-term profitability. Examples include trademarks, copyrights, brands, customer relationships, and knowledge. The capacity gap within an organisation is concealed by its intangible assets (Shehzad et al., 2014). Patents, goodwill, and other intangible assets are listed in traditional financial reporting statements as tangible assets, although an organization's intellectual capital is untapped potential (Chu et al., 2006)

Human capital, structural capital, and relational capital are the three fundamental and interrelated components of universities' intellectual capital. Several methods describe the elements of an institution's intellectual capital, but the tripartite classification is by far the most widely used in specialised literature (Bezhani, 2010; Canibano and Paloma Sanchez, 2009; Chu et al., 2016).

Human Capital

Investing in human capital, which consists of educated employees and their experience, is critical to achieving performance efficiency. Structural capital refers to all the elements and activities necessary for an organisation to succeed and advance. As the wellspring of innovation and strategy renewal, human capital reflects the inherent intelligence of an organization's people resources. If an organisation has strong structural capital, including human capital infrastructure, a reliable operating system, and a healthy corporate culture, its intellectual capital will reach its full potential (Kamaluddin & Abdul Rahman, 2009).

The definition of human capital includes a wide range of resource characteristics, including attitude, intellectual agility, tacit knowledge, and people's abilities, as well as employees' knowledge, competencies, skills, capability, and inventiveness (Khalique et al., 2011). Bontis & Fitz-enz (2002) describe human capital as a combination of three elements, including 1) personality traits that are brought to the job, such as intelligence, vigor, a pleasant attitude, dependability, and devotion; 2) a person's learning aptitude, which includes intelligence, imagination, creativity, and talent; and 3) a desire to share information or knowledge, a sense of belonging, and a goal-oriented mindset. According to Pedro et al. (2018), academic research and human resources were the University's secondary goals, with information creation and dissemination being its significant objectives.

Structural Capital

Structural capital is crucial to an organization's system and structure. Without structural capital, human capital would not exist. Human capital ought to be utilized in conjunction with structural capital. If there is a system to deal with how new knowledge results in better products, people can only provide information (Anggraini et al., 2018)

These components energize research and learning while aiding in the development of internal organizational structures (Lu, 2012). Employees use structural capital, such as hardware, software, databases, organizational structure, patents, trademarks, information systems, copyrights, company images, system policies and procedures, routines, and others, to support their business operations and processes (Wang et al., 2014). The structural capital of an organization includes its infrastructure, system policies, and operational processes.Bontis et al. (2000) Click or tap here to enter text.emphasize that structural capital consists of all non-human knowledge deposits in businesses, such as databases, organizational charts, processes, strategies, and routines, and conclude that any business whose market worth exceeds its financial value has structural capital. As a result, organizations with strong structural capital will foster an environment where staff members are encouraged to try new things, learn about them, and put them into practice.

Relational Capital

Click or tap here to enter text.Corcoles et al (2011) define relational capital as the extensive network of links the University has built and upheld with its non-academic partners, including enterprises, non-profit organizations, local government, and society at large. Additionally, it includes how others view the University, including its reputation, allure, and dependability. According to Wang et al (2014), an organization's relationships with and perceptions of its external stakeholders are a key component of its relationship capital.

The establishment, maintenance, and fostering of strong relationships with any companies, people, or groups that impact company success is known as relational capital. Under this new economic paradigm, universities have started considering how to make money from the knowledge they now possess as educational institutions (Lu, 2012). If a university enjoys positive relationships with many of its clients, it is more likely to continue to be profitable. Except for revenue-enrolled students, the university administration has mostly embraced initiatives to use their skills to generate additional income by providing training and study services to other schools. The value of an organization's relationship capital determines its revenue (Thursby & Kemp, 2002). Maximizing relational capital allows universities to improve quality, thus engaging better with the community.

- The current study assesses the knowledge assets, i.e., intellectual capital in Malaysian public universities and their contribution to the University's performance.

Research Methodology

Ten (10) out of 20 public institutions of higher education in Malaysia were selected as the sample. The sample size for this study is 56 respondents. According to Hair et al. (2018), the minimum sample required to perform sample-to-variable ratio analysis is at least 5:1, but ratios of 15:1 or 20:1 are preferred. Accordingly, although a minimum of five respondents must be considered for each independent variable in the model, 15 to 20 observations for each independent variable are strongly advised. The current study examines three variables that satisfy the 15:1 ratio requirement for a more suitable sample size.

The research instrument in this study is a questionnaire survey. The questionnaire was adopted from Kucharcikova et al (2015); Salinas-Avila et al (2020) to measure knowledge assets and Zangoueinezhad & Moshabaki (2011) to measure university performance. The questionnaire consisted of four main sections. Sections A, B, and C requested the respondents to respond to the questions related to governance, knowledge asset and the University's

performance. Section D entails the demographic profile of the respondents. The measurement scale ranged from 1 (Strongly disagree) to 5 (Strongly Agree) for governance, knowledge asset and the University's performance variables.

Results and Discussion

Descriptive Analysis of Respondents' Profile

A total of 56 respondents participated in this study. The respondents' profile includes University, gender, age, level of education, current position, working experience and the number of years the University has been established. The majority of the respondents are aged between 41 to 50, comprising 42.9%, followed by respondents aged between 51 to 60, which consist of 28.6%, while 23.2% of respondents aged between 31 to 40, and 5.4% of respondents aged between 21 to 30. The respondents are dominated by females, with a total of 69.6% compared to the male respondents, which is 30.4%. The results show that slightly more than half of the respondents have a doctoral degree, which comprises of 57.1%, followed by a master's degree (25%), bachelor's degree (10.7%), diploma level (5.4%), and lastly, professional qualification (1.8%). There are four ethnic groups: Malay, Bumiputra Sabah, Iban and others. The Malays comprised most of the sample (92.9%), followed by Bumiputra Sabah (3.6%) and Iban and others 1.8% each.

In Malaysia, public universities have been categorized into three major groups: 5 research universities, 11 focused universities, and four comprehensive universities. A final sample of 4 research universities, 2 Focus Universities and 4 Comprehensive Universities were included in this study.

Most of the respondents are from University Teknologi MARA (51.8%), 14.3% from Universiti Utara Malaysia (UUM), 10.7% from Universiti Kebangsaan Malaysia (UKM), 7.1% from Universiti Islam Antarabangsa Malaysia (UIAM), followed by Universiti Sains Malaysia (USM) 5.4%, Universiti Sains Islam Malaysia (USIM) 3.6% and lastly by Universiti Malaysia Sabah (UMS), Universiti Malaysia Sarawak (UNIMAS), Universiti Malaya and Universiti Putra Malaysia (UPM) with 2.5% each.

33.9% of the respondents hold a lecturer position, followed by a deputy dean (14.3%). Administrative, deputy director and head of programmes post with 10.7% each, executive officer 5.4%, and Deputy Vice-Chancellor, Dean, PTPO, Rector/Director and others with 7.5% each.

Most respondents have between 16 to 25 years of working experience. In this study, the University's establishment above 60 years is 42.9%, 31-40 years and 51-60 years are 21.4% each, followed by 21-30 years (10.7%) and lastly, 41- 50 years (3.6%).

Table 1
Respondent's Profile

Variables	No of Respondent (N=56)	Percentage %
University		
Comprehensive University		
Universiti Islam Antarabangsa Malaysia (UIAM)	4	7.1
Universiti Malaysia Sabah (UMS)	1	1.8
Universiti Malaysia Sarawak (UNIMAS)	1	1.8
Universiti Teknologi MARA (UiTM)	29	51.8
Focused University		
Universiti Utara Malaysia (UUM)	8	14.3
Universiti Sains Islam Malaysia (USIM)	2	3.6
Research University		
Universiti Kebangsaan Malaysia (UKM)	6	10.7
Universiti Malaya	1	1.8
Universiti Putra Malaysia (UPM)	1	1.8
Universiti Sains Malaysia (USM)	3	5.4
Gender		
Male	17	30.4
Female	39	69.6
Age		
21-30	3	5.4
31-40	13	23.2
41-50	24	42.9
51-60	16	28.6
61-70	0	0
Race		
Malay	52	92.9
Bumiputra Sabah	2	3.6
Iban	1	1.8
Others	1	1.8
Level of Education		
Diploma/Matriculation/Foundation	3	5.4
Bachelor Degree	6	10.7
Master's Degree	14	25
Doctoral Degree	32	57.1
Professional Qualification	1	1.8
Position		
Deputy Director	6	10.7
PTPO	1	1.8
Administrative	6	10.7
other	4	7.1
Deputy Vice-Chancellor	1	1.8
Rector/Director	1	1.8
Dean	1	1.8
Deputy Dean	8	14.3

Head of Programs/Unit/Department/Centre	6	10.7
Executive Officers	3	5.4
lecturer	19	33.9
Working Experience		
0-5 years	7	12.5
6-10 years	9	16.1
11-15 years	14	25
16-20 years	10	17.9
21-25 years	10	17.9
26-30 years	4	7.1
Above 30 years	1	3.6
University Establishment		
21-30 years	6	10.7
31-40 years	12	21.4
41-50 years	2	3.6
51-60 years	12	21.4
Above 60 years	24	42.9

Based on the Cronbach's Alpha values reported in Table 2, two measurements are above 0.70, ranging from 0.725 (university performance) to 0.929 (knowledge asset), implying that the data is valid (George & Mallery, 2003). Such results suggest that the data in this study is reliable.

Table 2
Summary of Cronbach's alpha

Variables	No of statements	Cronbach's Alpha
Knowledge Assets	21	0.929
University's Performance	24	0.725

Knowledge Asset

Factor analysis has been conducted to group the individual items into three dimensions: human capital, structural capital and relational capital. Based on Table 3, the sampling is adequate or sufficient as the value of KMO is larger than 0.5 (Field, 2009). Out of 21 items, two items of knowledge assets were deleted as they were less than 0.5.

Table 3
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.745
Bartlett's Test of Sphericity	Approx. Chi-Square	551.653
	df	210
	Sig.	<.001

Table 4
Rotated Component Matrix

	Component		
	1	2	3
Hires the right talent		.545	
Makes a new employee feel comfortable		.888	
Provides training to employees in order to constantly upgrade their skills		.852	
Offer career succession planning to retain employees		.543	
Practices good system of recruitment and selection, staff evaluation and career development		.630	
Provides teaching capacities and competency	.790		
Is committed to values and practices aimed at promoting research	.744		
Trains lecturers to carry out research (e.g., new technologies, writing scientific articles, data analysis software)	.756		
Has standards and procedures that effectively promote and support lifelong learning	.856		
Has a communication system that allows me to be adequately informed on time on the main issues and events related to the investigation	.588		
Receives constructive feedback, guidance, and suggestions from my department colleagues	.512		
The research projects carried out at the University are aimed at solving real problems and the regional context	.623		
The University fosters research partnerships among interdisciplinary research groups	.774		
The University promotes and supports the holding of academic events for the dissemination of knowledge	.709		
Allows lecturers to dedicate enough time to carry out research projects via proper policy			.733
Excellent opportunities are provided for staff to pursue interests in research.			.568
Has a proper database for faculty to be productive in research			.699
Periodically makes public recognition of the research faculty for university achievements and awards received			
Allocates a sufficient budget for research			.752
The University actively promotes research and extension agreements with the public and private sectors.			.527
The University promotes and supports academics' international mobility for research internships.			

Table 5 presents the means and standard deviations of the knowledge asset on human capital, structural capital and relational capital. The overall mean score of 4.24 for these three knowledge assets indicates that respondents perceived their University as providing more

support for structural capital. Structural capital has the highest score among the other two types. The second highest mean score applies to relational capital (mean=4.10), which indicates that the respondent agreed that their organization provides support in terms of relationships and networks for the researchers and the entire organization. Finally, human capital management is viewed as less applied as perceived by the top management in their organizations or universities. On average (mean=4.07), the respondents perceived that the process of acquiring, managing, and retaining employees for them to contribute effectively to the organisation process is less emphasized by management.

Table 5
Mean and Standard Deviation of Knowledge Asset

	Mean	Standard. Deviation
Human Capital	4.07	0.52504
Structural Capital	4.24	0.55444
Relational Capital	4.10	0.52035

Table 6 presents the mean scores of statements to measure the perception of knowledge assets by the respondents. Based on all the 19 statements, "the university promotes and supports the holding of academic events for the dissemination of knowledge" (mean=4.47) is the most agreed upon statement viewed by the respondents for their University.

Table 6
Mean and Standard Deviation of Knowledge Asset

My University	Mean	Standard. Deviation
Hires the right talent	4.25	.494
Makes a new employee feel comfortable	3.93	.694
Provides training to employees to constantly upgrade their skills	4.25	.670
Offer career succession planning to retain employees	3.90	.810
Practices good system of recruitment and selection, staff evaluation, and career development	4.00	.784
Provides teaching capacities and competency	4.25	.670
Is committed to values and practices aimed at promoting research	4.35	.700
Trains lecturers to carry out research (e.g., new technologies, writing scientific articles, data analysis software)	4.37	.705
Has standards and procedures that effectively promote and support lifelong learning	4.30	.758
Has a communication system that allows me to be adequately informed promptly on the main issues and events related to the investigation	4.10	.709
Allows lecturers to dedicate enough time to carry out research projects via proper policy	3.97	.832
Has excellent opportunities provided for staff to pursue interests in research	4.20	.723
Has a proper database for faculty to be productive in research	3.82	.844
Receives constructive feedback, guidance, and suggestions from my department colleagues	3.98	.733
Periodically makes public recognition of the research faculty for university achievements and awards received	4.25	.742

Allocates a sufficient budget for research	4.12	.516
The research projects carried out at the University are aimed at solving real problems and the regional context	3.92	.764
The University actively promotes research and extension agreements with the public and private sectors	4.37	.586
The University fosters research partnerships among interdisciplinary research groups	4.40	.709
The University promotes and supports the international mobility of academics for conducting research internships	4.18	.781
The University promotes and supports the holding of academic events for the dissemination of knowledge	4.47	.599

University Performance

Factor analysis has been conducted to group the individual items into four dimensions of university performance based on financial, customer, internal process and learning growth. Based on Table 7, the sampling is sufficient as the value of KMO is larger than 0.5 (Field, 2009). Out of 24 items, two items of university performance were removed as their values were less than 0.5 (Table 9).

Table 9 presents the mean scores and standard deviations for university performance. Based on the mean scores, the respondents agreed most with customers (Mean = 4.27), followed by internal growth (Mean = 4.19) as the second-highest mean score. Finance (Mean = 3.89) is the lowest-scored item.

Table 7
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.581
Bartlett's Test of Sphericity	Approx. Chi-Square	577.805
	df	276
	Sig.	<.001

Table 9
Rotated Component metric

	Component			
	1	2	3	4
Receives many annual grants from the industry			.851	
Receives huge amount of permanent endowment			.660	
Conducts student satisfaction survey			.544	
Shows an increasing trend in the number of student intake		.766		
Has a high number of applications		.793		
Has knowledge and skill sharing across work functions, units and locations				
Benefits many people from training programs conducted		.688		
Fairly distribute grades awarded.		.577		
Has a high number of teaching workshops attended by faculty		.658		
Has a high number of alumni in public service, NGOs				-.513
Has a high number of new products and services introduced (new courses, syllabus, programs and curriculum changes)				-.586

Satisfy with faculty – to – student – ratio		.515
Sustains good educational expenses per student		.769
Has a huge number of faculty in the specialized area		
Has efficient and effective use of facilities	.519	
Has a high number of faculty presentations at conferences	.638	
Has a high number of cross-trained and multi-skilled staff	.537	
Has a high number of courses incorporating new technology	.596	
Has a high number of new courses offered in the last five years	.651	
Has a high number of collaborators involved in joint activities	.648	
Sustain academic excellence	.647	
Has increased research productivity	.810	
Has increased outreach to the community	.578	
Has many entrepreneurial initiatives	.619	

Table 9
Mean and Standard Deviation of University Performance

	Mean	Standard. Deviation
Mean Finance	3.89	.51543
Mean Customer	4.27	.40354
Mean Internal Process	4.13	.38879
Mean Internal Growth	4.19	.45223

Table 10 depicts that most respondents agreed that their University has a considerable number of faculty in specialized areas (Mean = 4.45), and they are neutral that their University receives a considerable amount of permanent endowment (Mean = 3.73).

Table 10
Descriptive Statistics

My University	Mean	Standard. Deviation
Receives many annual grants from the industry	3.95	.783
Receives huge amount of permanent endowment	3.73	.816
Shows an increasing trend in the number of student intake	4.10	.672
Has efficient and effective use of facilities	3.80	.723
Has high number of applications	4.22	.660
Conducts student satisfaction survey	4.28	.679
Has knowledge and skill sharing across work functions, units and locations	4.10	.591
Benefits many people from training programs conducted	4.42	.501
Has a high number of alumni in public service, NGOs	4.30	.648
Has a high number of new products and services introduced (new courses, syllabus, programs and curriculum changes)	4.30	.608
Fairly distribute grades awarded	4.25	.630
Satisfy with faculty – to – student – ratio	3.80	.687
Sustains good educational expenses per student	3.83	.675

Has a huge number of faculty in the specialized area	4.45	.639
Has a high number of faculty presentations at conferences	4.10	.709
Has a high number of cross-trained and multi-skilled staff	4.00	.847
Has a high number of courses incorporating new technology	3.98	.530
Has a high number of teaching workshops attended by faculty	4.27	.640
Has a high number of new courses offered in the last five years	4.20	.687
Has a high number of collaborators involved in joint activities	4.08	.730
Sustain academic excellence	4.43	.636
Has increased research productivity	4.27	.716
Has increased outreach to the community	4.37	.540
Has many entrepreneurial initiatives	4.20	.564

Conclusion

The results from this study support the findings of previous research that there are three dimensions of intellectual capital: human capital, structural capital and relational capital and four dimensions of university performance, which are finance, customer, internal process and learning growth. The respondents also agreed that their University provides higher support for the three-knowledge capital, especially on structural capital. Apart from that, the respondents also viewed that their university performance was well established on the four factors with the highest mean on the customer.

The current study contributes to the proposed measurement model for intellectual capital in public universities from both academic and practical perspectives. This is crucial as intellectual capital is a knowledge asset that creates values and a source of competitive advantage in many organisations. The research contributes to the intellectual capital literature of the ASEAN countries where the university settings, culture, economics, and social environment provide different views and expectations.

The current finding indicates that structural capital is significant to the University's performance. The result offers insight to the managers of public universities on the importance of investing in efficient processes, procedures, intellectual properties, and quality work culture cum enhancement in technology, as these sources lead to higher university accomplishment.

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