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Alumni Rating Index and Monitoring Dashboard Technology to Improve University's Performance and Service Quality

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ABSTRACT

Limited number of university ranking systems have considered the perspectives of alumni or individuals who have availed themselves of the educational programs or services provided by the institutions. In Malaysia, there is a lack of comprehensive rankings or assessments that primarily focus on assessing university performance through the lens of student experiences. In the absence of authentic user experiences, prospective students and other relevant parties commonly rely on conventional academic rankings such as the *QS* or *THE* to ascertain the quality of a university. The primary aims of this research endeavour encompass the identification of pivotal variables for the evaluation of higher learning institution's performance, the creation of an alumni rating index, and the establishment of a performance monitoring tool utilizing dashboard technology. The goals are to enhance performance and service quality of institutions of higher education. The present study utilizes a quantitative research approach and centres its investigation on many cohorts of graduates originating from a prominent Malaysian university. A rigorous cluster sampling procedure was implemented. The assessment of alumni rating is conducted across twelve dimensions, with each component being evaluated using appropriate variables that enable the calculation of the desired index and facilitate the execution of intricate studies. The analytics that were performed and the alumni rating index that was calculated were subsequently shared with stakeholders through the use of an analytical dashboard. The dashboard was developed on user experience (UX) design principles. The evaluation of the produced dashboard is thereafter conducted by a group of stakeholders who have direct involvement in enhancing alumni engagement. The findings suggest that the university attained elevated ratings in the domains of social involvement, educational resources, and financial value. However, the scores for financial aid, student development, and student well-being were significantly lower. Despite the provision of various financial support, the respondents hold the belief that these forms of assistance are inadequate. The paper concludes by demonstrating the implementation of an alumni rating dashboard. The research is expected to facilitate the development of a

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localise university rankings and ratings, as well as informed policy-making efforts at the ministry level.

1. Introduction

According to Jamalludin *et al.,* [1], the higher education system in Malaysia has experienced substantial growth since the establishment of the University of Malaya (UM) in 1949, which was a component of the Federation of Malaya. Malaysia has continually enhanced and fortified its higher education system in order to adapt to shifts in the global and local economy. The National Higher Education Strategic Plan (PSPTN) aims to equip Malaysian higher education with the necessary knowledge and skills to support long-term economic growth, while also establishing Malaysia as a global educational hub. Higher education must adapt and progress in order to address global trends and prepare for future issues. One such challenge is establishing local higher education institutions on the global stage through the implementation of an appropriate performance measuring system.

There are many ways to measure performance of higher learning institutions such as via academic rankings, ratings, outcome-based education [2], achievement in certain courses [3], and students' technological acceptance level [4]. The growing number of universities in response to the massification of higher education has prompted the establishment of worldwide rating systems. The global ranking systems play a crucial role in establishing the criteria used to delineate disparities in the quality of research and higher education institutions. The fundamental objective of these systems is to aid important stakeholders, including students, parents, and industry professionals, in the process of selecting educational institutions that align with their specific preferences and requirements [5-7]. The primary objective of university rankings is to uphold a substantial degree of credibility and exert a significant impact within the realm of higher education [8]. According to Chirikov [9], the reliability of rankings is predicated upon the notion that rankers offer unbiased information to individuals such as prospective students, university administrators, and policy makers. Nevertheless, conflicts of interest arise for rankers when they provide fee-based analytical, advisory, and promotional services to universities, in addition to their objective evaluation of university performance. He added that conflicts of interest have the potential to compromise the objectivity of ranking metrics, so granting certain colleges advantages that are unrelated to their institutional excellence. The utilization of biased measurements has the potential to disseminate inaccurate information regarding the global rankings of universities and countries, hence leading to misinformation among prospective students, universities, governments, and funders. The core evaluation of the quality of higher learning institutions is to set up guidelines for students' development including collaborations with external parties that would help universities in their graduate employability. Generally, the QS Graduate Employability rankings system is used to compare university performance in terms of graduate employability outcomes and prospects. Most of the ratings focus on student's evaluation, academic criterion, and quality of education. This has been supported by the Times Higher Education (THE) rankings which used data from the invitation-only academic reputation survey, where the scholars are requested to list 15 universities that they believe are the best for teaching and research. Furthermore, the Centre for World University Rankings (CWUR) listed the world's top 1000 universities based on the quality of education, the prestige of the faculty members and the quality of the published research. There are several global ranking bodies in higher education highlighting alumni attitudes and reputation to determine the best universities. However, not many of these ranking tools factored in the actual ratings of those who have consumed the goods and services from the universities, known as alumni. The best evaluation of the quality of academic institutions will allow a combination of different methodologies of the ranking.

Besides students and academia indicators, alumni also act as an important criterion for evaluating the quality of academic institutions. This has been supported by Busteed [10] who reported that there were top 25 colleges and universities according to alumni ratings whereby it includes an incredible variety of regional campuses from religious college, a military academy and even private university. Alumni factors capture alumni's expression of their unique contribution and their college experience that made them grow and succeed in the real world. Through these alumni ratings, the current top-ranked university was revealed. Previous study showed that alumni ratings could help the university top management to develop a more accurate rating system. For example, the Wall Street Journal/ Times Higher Education rankings count only 17% of their alumni as a ranking weighting, while the US News World Report includes only 3% of their alumni rankings as a weighting. Henceforth, this study is focusing on alumni's experiences and its relationship with university quality. Alumni Rating Index will be developed in this study as a determinant of the quality. The index will be adopted from Rothwell [11] and will be a new study in Malaysia context. The objectives of the study are

i. To determine an information gap and make higher education more efficient based on the consumer ratings of higher learning institution.
ii. To be able to ascertain which factors that could predict the quality of universities.
iii. To develop an Index of Alumni ratings for higher learning institution within local universities/colleges in Malaysia
iv. To develop corresponding monitoring tool using dashboard technology

Establishing an index of alumni ratings from the perspectives of the alumnus is essential to measure a university's performance, capabilities and supporting resources. The significance of alumnus' assessment is invaluable and valid for testimonial and continuous improvement purposes. Thus far, there is no alumni rating index at the national level that can facilitate relevant policy making. In the United Kingdom, there is a ranking among universities for "best student life and experiences". These rankings and information help future students to choose their preferred university. The proposed index of alumni ratings will help the university to identify potential improvements while at the ministry level relevant policy can be formulated to drive the improvements. The ratings can also be used as a monitoring tool for the policy makers vis-à-vis measuring the improvement in student life, academic and utilization of university resources. A ranking between universities in Malaysia can then be established using the alumni ratings. These rankings and ratings are different from other ranking measurements such as the *THE* and *QS* since respondents are university alumni, and the measurements are based on alumni' own experiences and opinions. The remaining part of this paper is organized as follows. Section 2 elaborates on survey of literature followed by research methodology in Section 3. Analysis of findings is highlighted in Section 4. Section 5 presented the development and application of the monitoring dashboard before research conclusion is drawn in the following section.

2. Literature Review

Alumni ratings have been used as a source of evaluative information in institutions of higher education in several different ways. In a study by Wise *et al.,* [12], alumni ratings on the teaching performance of individual professor were compared with ratings of current enrolled students. Results showed the ratings had a relatively high degree of stability, but the study assessed only one dimension - individual teaching. In a study of 25 graduate departments of History, Chemistry, and Psychology [13], alumni were asked to provide information about their current professional status, career accomplishments, and their opinions of their college training, which would be used in program improvement. The study reported that nearly 60% considered alumni ratings and opinions to be "very

important" information in departmental reviews and evaluations for departmental use. Meanwhile, another study represents a much broader approach [12]. Alumni in this study provided their assessments of the skills needed for success in their current profession and stressed that cognitive and affective skills such as sensitivity, team membership, supervision of work, and oral communication were important factors for a successful future career. The usefulness of alumni ratings is very important in assessing the quality and ranking of universities [11]. Thus, before endorsing the use of alumni ratings as an indicator of university rankings, several issues need to be addressed. Besides Rothwell [11], Sando and Ferenčak [14] identified several issues that need to be resolved. Firstly, do alumni give ratings based on the same dimensions as they did when they were enrolled as students? If they do, then comparisons between the ratings for the two groups can be made in a straightforward fashion. However, if they do not, caution should be used in comparing the two sets of evaluations. Secondly, if they do rate in the same manner, then is alumni data worth collecting at all? Alumni data is certainly costly to collect and, if the data is redundant when compared with student ratings, then such collections are not cost-effective. A third issue concerns the influence of one's job situation on the ratings of departmental quality. This influence represents a potential threat to the validity of the ratings and, if it is appreciable, then the ratings must again be interpreted with caution.

Despite that Rothwell [11] has opened widen views on how alumni rating is much significant to explain universities' quality, the study limited the data only from consumer surveys taken from the Strada-Gallup Consumer Survey. Such effort would be troublesome to outside US region, plus the unavailability on universities' consumer data in Malaysia. Besides, Rothwell's study failed to develop a consumer ratings index with respect to educational experience, although the work pointed out that alumni ratings will play an important role in helping potential students to choose their colleges and universities to further their study. From another perspective, Sando and Ferenčak [14] highlighted that evaluating the quality of academic institutions can be conducted by assessing academic and non-academic criteria The academic criteria merely discussed the scientific achievements of the academicians. Meanwhile, non-academic criteria focused on the success of current students and graduates and allocate more attention and focus to the success of the Alumni. The article also provided several methods of ranking evaluation such as Forbes online [10], the Shanghai List, the *THE* and the *QS* world university rankings methodology. Comparison of the institutions of higher education started with the formation of the Academic Ranking of World Universities list, which is published yearly by the Shanghai Jiao Tong University. The Shanghai List ranks the 500 most successful universities in the world with reference to Laureates of the Nobel prize, scientific awards, and citations within the most prominent citation indexes. The evaluation of this method uses several pre-formed criteria that contain defined and adequately weighted indicators. The criteria used are the quality of the education and the institution, and the scientific research and articles cited. Unfortunately, the method of ranking the academic institutions takes into consideration only the academic criteria but does not count the success of graduated students (alumni).

In German universities, the ranking of educational institutions was issued by the CHE Hochschul Ranking. The methodology is based on a combination of academic and non-academic criteria. Besides the 37 indicators divided into 9 modules, the criteria also factor in fields of research, which are divided into one of the four groups: top, middle, bottom and unspecified. Data is collected through questionnaires administered to members of departments or faculties, professors, and students. In fact, the methodology also considers alumni feedback as one aspect of the evaluation; however, it was not given any value or weighting. Other rankings like the Forbes methodology also considered a ranking methodology based on non-academic criteria. The method seems likely to be the best as it takes into consideration the success of students during their studies and after they finish. In addition, with a business-orientated approach, the use of the achievements of current students and graduates as the starting point for development of a university ranking system seems reliable. In total, the

achievements of the alumni and their salaries had a weighting of 25%, the highest compared to other methodologies. This percentage shows that communication between the academic institutions and graduated students is very important when it comes to the university rankings. Since 2010, the QS World University rankings have been published separately from those of Times Higher Education. In general, the QS ranking focuses heavily on academic reputation, which carries a 40% weighting. Other indicators are employer reputation (10% weighting), student faculty ratio (20% weighting), citations per faculty (20% weighting) and internationalization (10%weighting). The method involves simply naming the academic institutions which the respondents think is the best in their field of interest. Due to this means of creating the rankings, the opinions of graduated students are not represented in this methodology; however, the feedback of employers about these graduates certainly exists. Based on Wherry and Bartlett [15] in their theory of rating, an accurate rating involved 3 major components which are performance of the ratee, observation of that performance by the rater, and the recall of those observations by the rater. The development of the theory of rating unfolds by defining the various factors that affect each of these components in a series of linear equations. This theory will guide researchers to identify university quality base on alumnus observations and perceptions. Further arguments on the importance of 'authentic' rankings and how new approach is needed were highlighted by Anowar *et al.,*[16]. They pointed out that none of these ranking systems can provide a satisfactory assessment of their construct validity and other disputation-related parameters. In addition, they also argued that these rankings lack trustworthiness, are inadequate, and are susceptible to misinterpretation because respondents are limited to academic colleagues and experts whose opinions may be influenced by the image and reputation of the institutions. The issue with these existing rankings is also echoed by Bellantuono *et al.,*[17], pointing out structural biases that affect in inhomogeneous ways the ranking outcomes of universities. Vidal and Ferreira [18] stated that most ranking systems are based essentially on research activities including indicators such as research productivity, research income or papers leaving aside the other important functions of the universities. Certain rankings also put too much emphasis on reputation and institutional resources and are not sufficient for promoting policy decisions or consumer choice [19].

3. Methodology

Analytical development of alumni rating was carried out based on the framework as shown in Figure 1. Through this framework, the experience of alumni during their time on campus is measured in twelve dimensions. All these dimensions consider the services that have been provided to alumni including academics, character and self-development, career development and impact, financial support, facilities provided, reputation of the university, and other related support services. Based on the designed framework, a valid database was identified and only Universiti Utara Malaysia (UUM) alumni are eligible to respond to the survey. Next, a methodology that comprises details of process for data collection, analytics, and dissemination of the outputs for stakeholders was imposed. All work was evaluated to ensure that the results produced from these analytics and dashboards are valid and reliable.

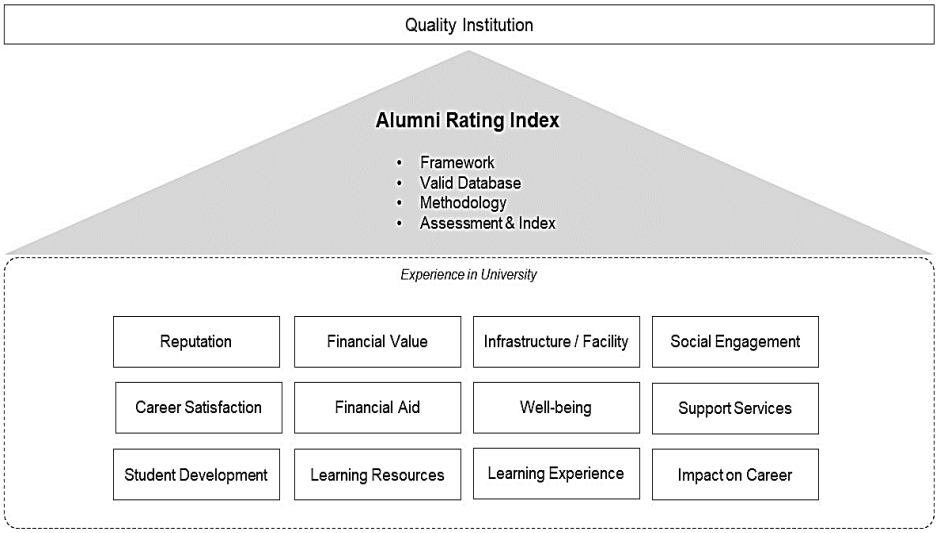


Fig. 1. Main framework of alumni rating index

Each dimension in Figure 1 was measured using suitable variables to permit the computation on the targeted index, as well as the execution of complex analyses. The variables measured through items for alumni rating in the developed questionnaire are given in Table 1. The following Figure 2 shows the conceptual framework of this research. Each item was prepared using a Likert Scale in range 1 to 5 of which the lowest scale means strongly disagree and the highest scale means strongly agree.

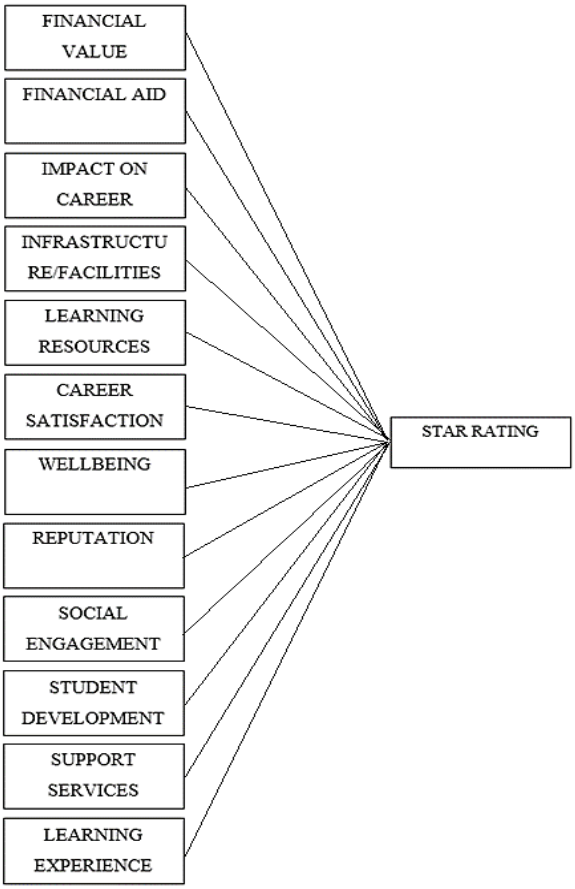


Fig. 2. Conceptual framework of alumni rating index.

Table 1
Details information about variables in computing alumni rating index

Variable	Description	Item	Label
Financial Value (FV)	Alumni value their education costs, tuition fees, and cost of living during their studying period at the institution	My education was worth the cost.	FV1
		Tuition fee in my institution was worth paying.	FV2
		The cost of studying and living at my institution was worth paying.	FV3
Reputation	Alumni value, perception and appreciation towards the institution credibility	1. Reputation of my institution helped me in my career.	REP1
		2. I would recommend the educational path I took to other people.	REP2
		3. I would not be where I am today without education in my institution.	REP3
		4. If I had to do it all over again, I would choose the same institution.	REP4
		5. I am very proud of my institution.	REP5
		6. I am very proud of my institution's ranking.	REP6
Social Engagement	Alumni engagement with colleagues, lecturers, and administrative staff during their studying period at the institution	1. My engagement experience with colleagues during my study was very good.	ENG1
		2. My engagement experience with lecturers during my study was very good.	ENG2
		3. My engagement experience with administrative staffs during my study was very good.	ENG3
Financial Aid	Alumni knowledge regarding scholarship, load and financial support provided by the institution	1. To the best of my knowledge, my institution provided scholarships to students.	FIN1
		2. To the best of my knowledge, my institution provided loans to students.	FIN2
		3. To the best of my knowledge, my institution provided financial support to students.	FIN3
Infrastructure / Facility	Alumni perception towards the institution's infrastructure and facilities, which include lecture halls, students' residential as well as recreational and sports facilities.	1. Lecture Hall has been well equipped.	INF1
		2. Students' residential was very comfortable.	INF2
		3. Recreational / sport facilities have been well equipped.	INF3
Support Services	Alumni perceptions of services provided by the student affairs department, the health care unit, and counsellors	1. Students Affairs Department in my institution provided support services for students' welfare and well-being.	SS1
		2. My institution provided healthcare services.	SS2
		3. My institution provided counsellors for academic and personal matters.	SS3
Well-being	Alumni opinion towards the institution's priority on students' welfare and well-being, accommodation, mental as well as physical health	1. My institution prioritized students' welfare and well-being.	WB1
		2. Accommodation has been provided for students.	WB2
		3. My institution prioritized students' mental and physical health.	WB3
Student Development	Alumni opinion towards institutional priority on career development programmes, graduate employability programs, and entrepreneurship programmes	1. My institution provided good career development programme.	SD1
		2. My institution prioritized graduate employability.	SD2
		3. Good entrepreneurship development programme has been provided.	SD3
Learning Experience	Alumni opinions towards their educational experience during	1. I received a high-quality education.	LE1
		2. I learned important skills during my study that I use in my day-to-day life.	LE2

	their studying period at the institution	3. The coursework I took is directly relevant to what I do at work.	LE3
		4. My educational experiences make me an attractive candidate to potential employers.	LE4
		5. If I had to do it all over again, I would obtain the same degree of education in the similar institution.	LE5
		6. If I had to do it all over again, I would study the same major/course.	LE6
Learning Resources	Alumni perspectives on information gathering and technological resources during their time at the institution	1. Library has been equipped with good resources and materials.	LR1
		2. Learning technology and resources have been properly equipped in lecture hall.	LR2
		3. It was easy to gather information for learning purposes.	LR3
Career Satisfaction	Their thoughts on the courses they took at the institution, their interactions with others, and the faculty inspiration that aided their career development	How helpful have each of the following been to me so far in my career? The field I am working in.	SATIS1
		How helpful have each of the following been to me so far in my career? My current earning.	SATIS2
		How helpful have each of the following been to me so far in my career? My current designation.	SATIS3
		How helpful have each of the following been to me so far in my career? The asset that I possessed.	SATIS4
		How helpful have each of the following been to me so far in my career? The promotion(s) in my current career.	SATIS5
Impact on Career	Alumni satisfaction in their field of work, current earnings, current designation, asset that they possess, and promotion in their career	1. The course(s) taken is helpful in my career development.	IMP1
		2. People I met / engaged in my institution were helpful in my career development.	IMP2
		3. The faculty / school inspired me to become who I am today.	IMP3

The recognized items as listed in Table 1 above, were arranged accordingly in a questionnaire aiming at gathering valuable information from the identified alumni. Also, the questionnaire comprises a part where profiles of alumni were collected among others are gender, race, education level, nationality, alumni current designation, and industry of which they are currently working with. The designed questionnaire was made available on-line where it can be responded to at anywhere and anytime by the alumni. Universiti Utara Malaysia (UUM) alumnus have been chosen as respondents for this study. As one of the leading public universities in the country, UUM has recorded 146,089 alumni who graduated between 1988 and 2020. Their profiles were available in the Alumni Management Information System (AMIS) and could be reached via email. As for the purpose of the study, a systematic clustering sampling was executed where alumni from certain cohorts of graduation were randomly chosen. These cohorts include 5 years or less, 6 to 10 years, 11 to 15 years, 16 to 20 years and more than 20 years of graduation. In each cohort, around 15% alumni were approached for completing the questionnaire. The on-line questionnaire was made available for six days starting 28 May 2022 to 2 June 2022. All the collected responses were checked in terms of completion of response and anomalies where it could be possible. All the collected data were analyzed using analytics covering descriptive analytics. The tools were used to describe the behaviour of the measured variables, and to describe the computed index. Based on the framework as depicted in the following Figure 3 the intended alumni rating index was computed as follows

$$AlumNett\ Rating = \frac{\left[\frac{(ENG1,ENG2,ENG3,FIN1,FIN2,FIN3,FV1,FV2,FV3,IMP1,IMP2,IMP3,INF1,INF2,INF3,LE1,LE2,LE3,LE4,LE5,LE6,LR1,LR2,LR3,REP1,REP2,REP3,REP4,REP5,REP6,SATIS1,SATIS2,SATIS3,SATIS4,SATIS5,SD1,SD2,SD3,SS1,SS2,SS3,WB1,WB2,WB3)}{44}\right]}{5} \times 100\%$$

Fig. 3. Computation of alumni ratings index

4. Results

The study was able to get 481 responses from alumni. The profiles of those responded to the survey are as in Table 2.

Table 2
Profile of the sample

Profile	Category	Frequency	Percent
Gender	Male	316	65.42
	Female	167	34.58
Nationality	Malaysia	441	91.30
	Foreign	42	8.70
Age (years)	20 - 29	63	13.04
	30 - 39	100	20.70
	40 - 49	207	42.86
	50 - 65	111	22.98
	More than 65	2	0.41
Current job	Employed	394	81.57
	Own business(es) / Self-employed	59	12.22
	Studying	6	1.24
	Unemployed	24	4.97
Highest degree in UUM	Degree	313	64.80
	Masters	128	26.50
	PhD / Doctorate	42	8.70

The obtained sample has been found adequate to cover the population of UUM alumni to develop the alumni rating index. Discussion on the findings based on the research objectives that were set at prior is as follows.

RO1: To determine an information gap and make higher education more efficient based on the consumer ratings of higher learning institution.

The descriptive statistics on all measured items in the questionnaire are tabulated in Table 3. Overall, the mean for each variable is somewhat between 3.0 and 5.0 indicating that alumni are satisfied with the services that they had experienced. The highest satisfaction on the services is recorded by REP5 (I am very proud of my institution) while the lowest satisfaction is recorded by FIN2 (To the best of my knowledge, my institution provided loans to students). FIN2 turns in the lowest score since the University does not provide loan for education purposes as most students received the government loan or scholarship from agencies.

Table 3
Descriptive statistics on alumni rating index variables

Dimension	Variable	Mean	Std. Dev.	Overall Mean	Overall Std. Dev.
Financial value	FV1	4.42	0.763	4.39	0.786
	FV2	4.32	0.827		
	FV3	4.42	0.769		
Reputation	REP1	4.08	0.922	4.31	0.851
	REP2	4.38	0.789		
	REP3	4.31	0.866		
	REP4	4.20	0.975		
	REP5	4.60	0.662		
	REP6	4.31	0.890		
Social engagement	ENG1	4.52	0.697	4.26	0.819
	ENG2	4.25	0.806		
	ENG3	4.02	0.954		
Financial aid	FIN1	3.73	1.142	3.69	1.158
	FIN2	3.63	1.218		
	FIN3	3.72	1.115		
Infrastructure / facility	INF1	4.33	0.766	4.30	0.851
	INF2	4.22	0.938		
	INF3	4.34	0.848		
Support services	SS1	4.05	0.924	4.15	0.908
	SS2	4.33	0.840		
	SS3	4.08	0.959		
Well-being	WB1	4.04	0.892	4.16	0.840
	WB2	4.52	0.682		
	WB3	3.91	0.946		
Student Development	SD1	4.02	0.947	4.030	0.941
	SD2	4.02	0.926		
	SD3	4.05	0.949		
Learning experience	LE1	4.31	0.729	4.14	0.939
	LE2	4.29	0.818		
	LE3	4.05	0.988		
	LE4	4.17	0.886		
	LE5	4.02	1.070		
	LE6	3.97	1.144		
Learning resources	LR1	4.45	0.749	4.33	0.794
	LR2	4.24	0.841		
	LR3	4.30	0.791		
Impact on career	IMP1	4.22	0.905	4.15	0.937
	IMP2	4.13	0.924		
	IMP3	4.09	0.981		
Career satisfaction	SATIS1	4.25	0.816	4.14	0.888
	SATIS2	4.14	0.882		
	SATIS3	4.17	0.879		
	SATIS4	4.09	0.910		
	SATIS5	4.06	0.952		

In order to answer the query about the association between variables. A Spearman Correlation between pairs of variables was performed. There were 44 x 44 pairs of variables tested as the snapshot of some parts of the 44 x 44 matrix of correlation values is given in Figure 4. In general, it is obvious to spot that some of these variables are highly correlated, hence calculating each variable individually for alumni rating index could be biased. This result led to the next analysis to seek for shared-dimension of variables which could be ascertained by confirmatory factor analysis.

```
> cor(df1)
            FV1       FV2       FV3      REP1      REP2      REP3      REP4      REP5      REP6      ENG1
FV1   1.0000000 0.7039969 0.7059404 0.4111590 0.4810595 0.4755996 0.4183177 0.3899080 0.3049999 0.4198029
FV2   0.7039969 1.0000000 0.7718068 0.3142490 0.4307515 0.4170574 0.3915687 0.3714609 0.2860151 0.3685730
FV3   0.7059404 0.7718068 1.0000000 0.3444337 0.4348203 0.4578301 0.3857267 0.3815981 0.3008670 0.4228175
REP1  0.4111590 0.3142490 0.3444337 1.0000000 0.6240701 0.4822319 0.5249697 0.5255597 0.5919728 0.3940853
REP2  0.4810595 0.4307515 0.4348203 0.6240701 1.0000000 0.5680304 0.6285655 0.6350089 0.5355521 0.4672821
REP3  0.4755996 0.4170574 0.4578301 0.4822319 0.5680304 1.0000000 0.5279938 0.5276514 0.4459818 0.4462960
REP4  0.4183177 0.3915687 0.3857267 0.5249697 0.6285655 0.5279938 1.0000000 0.7269673 0.6148637 0.4154341
REP5  0.3899080 0.3714609 0.3815981 0.5255597 0.6350089 0.5276514 0.7269673 1.0000000 0.6526761 0.4717849
REP6  0.3049999 0.2860151 0.3008670 0.5919728 0.5355521 0.4459818 0.6148637 0.6526761 1.0000000 0.3407219
ENG1  0.4198029 0.3685730 0.4228175 0.3940853 0.4672821 0.4462960 0.4154341 0.4717849 0.3407219 1.0000000
```

Fig. 4. Snapshot of the 44 x 44 matrix of correlation

RO2: To be able to ascertain which factors that could predict the quality of universities.

As earlier described, there are 44 variables used to measure 12 dimensions that explain alumni rating on a university. Results from correlation analysis as presented earlier also indicate that these 44 variables are correlated, hence giving a proof that using single measured variables for computing the intended index could be harmful. However, there is an inquiry whether these variables are really mean for their respective dimension. To respond to this inquiry, confirmatory factor analysis was executed. By limiting the number of factors to 12, representing the 12-dimension, output from factor analysis informed that the set 12 factors can retain 72.60% of the original 44 variables (Figure 5). These 12 factors are adequate to represent the 44 variables as the chi-square statistics on the factors are significant at $\alpha = 0.05$ as the p-value is closest to null.

```
                Factor1 Factor2 Factor3 Factor4 Factor5 Factor6 Factor7 Factor8 Factor9 Factor10 Factor11 Factor12
SS loadings       6.087   5.435   3.565   2.994   2.734   2.624   2.326   1.957   1.465    1.378    0.842    0.550
Proportion Var    0.138   0.124   0.081   0.068   0.062   0.060   0.053   0.044   0.033    0.031    0.019    0.013
Cumulative Var    0.138   0.262   0.343   0.411   0.473   0.533   0.586   0.630   0.663    0.695    0.714    0.726

Test of the hypothesis that 12 factors are sufficient.
The chi square statistic is 1002.65 on 484 degrees of freedom.
The p-value is 1.99e-38
```

Fig. 5. Factor loadings in 12 set factors in factor analysis

The following Figure 6 shows the plot of the 12 extracted dimensions on the first two factors. In this figure, all the dimensions can be clearly spotted, and the clustering of these variables are well explained. As such, the 12 dimension is worth to be used in calculating the intended alumni rating index. Alumni rating index in listed in Table 4.

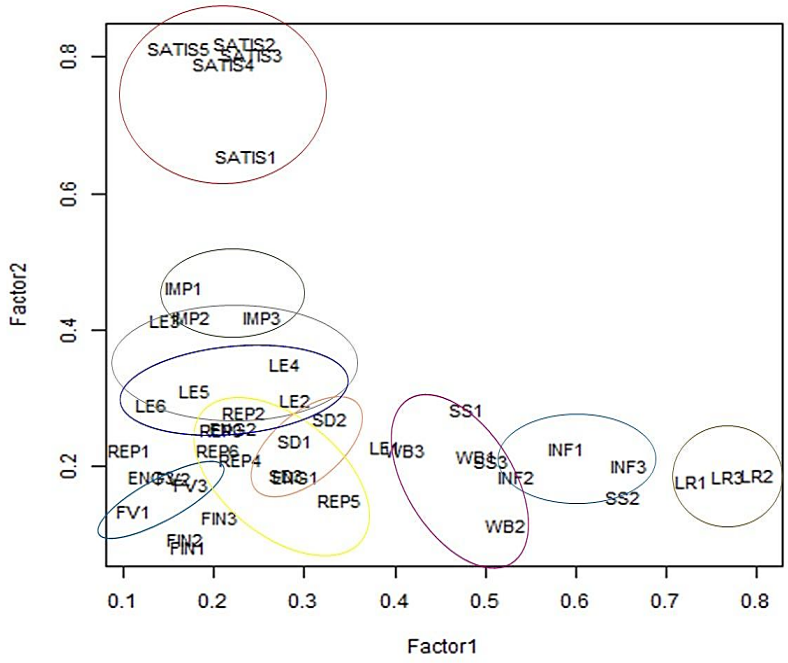


Fig. 6. Position of 12 dimension in the first two factors

RO3: To develop an Index of Alumni ratings for higher learning institution within local universities/colleges in Malaysia.

Table 4
Alumni rating index

Dimension	Rating Index
Financial Value	4.431
Learning Resources	4.446
Reputation	4.063
Infrastructure / Facilities	4.335
Social engagement	4.508
Well-being	4.029
Support services	4.046
Impact on career	4.215
Learning experience	4.308
Career satisfaction	4.249
Student Development	4.004
Financial aid	3.720
Overall Index	4.508

Table 4 indicates alumni ratings for the 12 dimensions. Social engagement receives the highest ranking, followed by learning resources and financial value. As the only public university to offer on-campus housing to all its students and to be located far from major metropolitan areas, the university has created a living environment with a comparatively cheap cost of living. In addition to investing millions of Ringgit, the government has equipped the university with modern and suitable instructional materials. The lowest score currently belongs to financial aid, followed by student development and welfare. Notwithstanding the numerous financial supports supplied by the university and the government, respondents believe that these aids are insufficient. The problem may be related to the university's low scholarship offerings and the underprivileged students' possible lack of information regarding the existence of financial aids. This lack of awareness may also

be associated with the "wellbeing" score. Nonetheless, these scores indicate a chance for the university to discover solutions and make improvements, particularly in the areas of financial assistance management, student welfare and student development. In terms of student development, a few studies have highlighted the significant impact that high-quality educational guidance has on students' performance, according to Jamaludin *et al.,* [20]. Getting guidance from others is crucial for achieving academic objectives and pursuing career or educational aspirations.

Table 5 shows the correlation values of all variables involved in this research. All the variables are positively and highly correlated with each other. Alumni surveys are an effective method for analysing the impact of college on students. Given the present focus on outcome evaluation, the function of alumni surveys in evaluating educational programs is very important. While alumni surveys usually focus on job experience and professions, there is little research on the link between these circumstances and alumni satisfaction with their university. The current study's findings are intended to show that employment experiences are highly connected to alumni's opinions of their university experiences. Graduates who are content with their professions are more likely to be satisfied with their school experiences.

Table 5
Correlation matrix

Variable	FV	REP	ENG	FIN	INF	SS	WB	SD	LE	LR	IMP	SATIS
FV	1	.534**	.419**	.273**	.427**	.371**	.421**	.351**	.423**	.326**	.403**	.437**
REP	.534**	1	.626**	.418**	.589**	.614**	.635**	.619**	.746**	.517**	.687**	.614**
ENG	.419**	.626**	1	.417**	.488**	.616**	.611**	.559**	.665**	.488**	.665**	.544**
FIN	.273**	.418**	.417**	1	.450**	.538**	.528**	.512**	.430**	.385**	.400**	.349**
INF	.427**	.589**	.488**	.450**	1	.736**	.721**	.574**	.556**	.675**	.497**	.528**
SS	.371**	.614**	.616**	.538**	.736**	1	.872**	.689**	.628**	.711**	.617**	.570**
WB	.421**	.635**	.611**	.528**	.721**	.872**	1	.676**	.653**	.672**	.627**	.560**
SD	.351**	.619**	.559**	.512**	.574**	.689**	.676**	1	.679**	.544**	.651**	.558**
LE	.423**	.746**	.665**	.430**	.556**	.628**	.653**	.679**	1	.559**	.832**	.696**
LR	.326**	.517**	.488**	.385**	.675**	.711**	.672**	.544**	.559**	1	.528**	.500**
IMP	.403**	.687**	.665**	.400**	.497**	.617**	.627**	.651**	.832**	.528**	1	.730**
SATIS	.437**	.614**	.544**	.349**	.528**	.570**	.560**	.558**	.696**	.500**	.730**	1

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)

3.1 Development and Application of the Monitoring Dashboard

All the executed analytics as well as the computed alumni rating index were disseminated to stakeholders using an analytical dashboard. The dashboard was designed using UX design with the process as depicted in Figure 7.

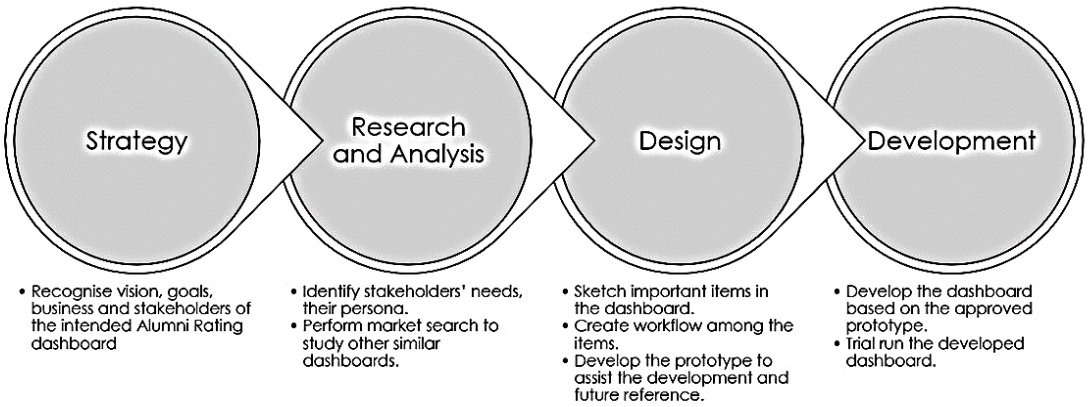


Fig. 7. UX design process in developing alumni rating dashboard

The proposed Alumni Rating Index framework covers instrument development, data collection method, analytical development, and analytical visualisation (dashboard). Instrument development develops a data collection tool in order to get alumni feedback on the measured items, data collection method outlines the way to reach alumni, analytical development sets the automated analysis on the retrieved data, and analytical visualisation via dashboard displays selected findings from the automated analysis aiming at portraying the performance of the university from the perspective of alumni. The art of work on the proposed framework is given in Figure 8.

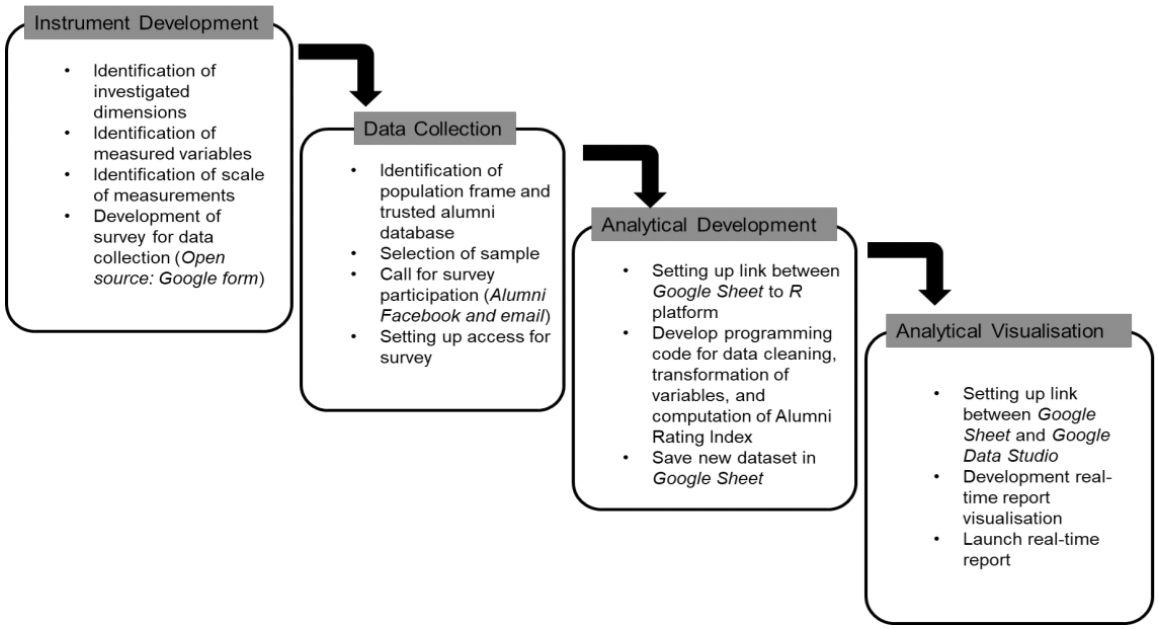


Fig. 8. Development framework for alumni rating index and analytical visualisation

Finally, the developed dashboard was assessed by selected stakeholders of whom are directly involved in strengthening engagement with alumni. Besides, the stakeholders were given training on how to use the dashboard to extract information and to make sense of the information from the dashboard. The developed analytical dashboard for visualising the computed alumni rating index is as depicted in Figure 9. The dashboard has six filter bars that allow user to drill down the index by specifying their interest on nationality, current designation, gender, industry, race, and level of education.

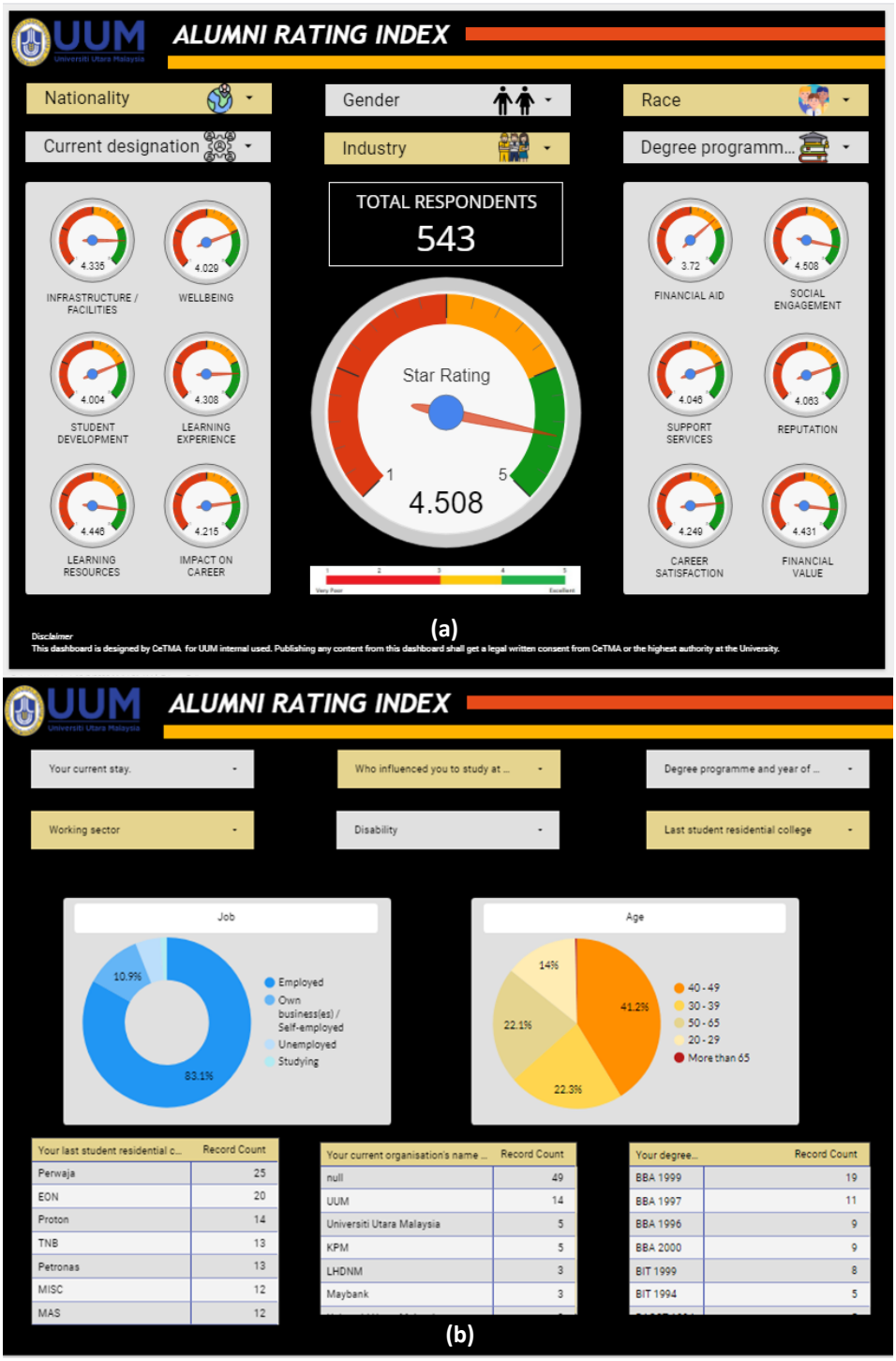


Fig. 9. Alumni rating index dashboard (a) Front page (b) Back page

5. Conclusion

This study aimed to assess the impact of alumni ratings on the quality of higher education in Malaysia. The study has the specific objectives of identifying any gaps in information regarding consumer ratings, determining the factors that can predict the quality of universities, creating an Index of Alumni ratings for local universities and colleges in Malaysia, and developing a monitoring tool using dashboard technology. This study provides recommendations regarding the alumni's experiences with the products and services offered by their universities throughout their tenure at

the institution. The results allow policy makers to pinpoint information gaps pertaining to consumer ratings and ascertain the elements that indicate the quality of a university. The results demonstrate that the university achieved the maximum scores in social engagement, educational resources, and financial value. However, the ratings for financial aid, student development, and student well-being were significantly lower. Based on the survey findings, it is recommended that the university take additional measures to enhance these aspects, as assessed by former students. As previously said, alternative methods of ranking and rating prioritise other stakeholders, such as faculty members, to a greater extent. This study offers valuable insights into the involvement of alumni in Malaysian higher education institutions, despite solely gathering the viewpoint of a single stakeholder.

This study encompasses the authentic evaluations of individuals who have procured or used goods or services offered by the university. The research suggests that the alumni factor encompasses the manifestation of a graduate's distinctive contribution and the college experience that nurtured their subsequent development and success. Alumni ratings have the potential to aid university administration in creating a more streamlined approach in light of alumni feedback and evaluations. The establishment of an alumni rating index and the utilisation of monitoring dashboard technology enable policy makers and universities to constantly improve and reinforce areas that receive excellent ratings from customers, while addressing areas where the university's performance is lacking. While this study specifically examined the responses of a specific Malaysian university, future research should encompass all Malaysian universities. Additionally, it is important to acknowledge that the fundamental principles of this topic are likely to be applicable to universities in other locations as well. This study will act as a crucial milestone and catalyst in creating a unique, consumer-focused national rating system for higher education institutions. The rating will serve as a motivating incentive for university administrators to actively pursue ongoing improvement measures, while also attracting potential students who are seeking the highest quality institution to register in.

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