Evaluation university ranking system using quacquarelli Symonds and integrated performance measurement system approach

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Abstract. Institutional assessment in the current era is indispensable because of increasing global competition and economic and information growth. Assessment efforts were also carried out on various factors including improving the quality of lecturers, meeting study programs that were in line with national development needs, developing educational curricula, improving the quality of community services and research, and adding internal and external collaboration. It aims to strengthen management and governance so that it has good performance and makes the university a World Class University (WCU). Fulfillment of WCU criteria in faculties or departments is one of the steps to determine the strategy for achieving a tertiary institution by giving more weight to faculty excellence to encourage the use of relevant new criteria. Also, in the ranking process, there are different criteria or indicators in several ranking techniques in the world as a manifestation of performance appraisal of the overall implementation of the organization. Quacquarelli Symonds (QS) is a rating agency that evaluates university weaknesses and strengths and produces assessments that show achievement ratings. The QS ranking also has six indicators that are believed to illustrate the value of the university.

1. Introduction
The university ranking system has an important role as a result of increasing global competition and economic and information growth. The goal is to measure the performance of higher education institutions, increase competence and competitiveness as a result of globalization, and increase the mobility of information needs related to higher education institutions [1]. Various efforts have been made to develop the ranking of tertiary institutions which include improving the quality of lecturers, fulfilling study programs that meet national development needs, developing educational curricula, improving the quality of community service and research, as well as adding internal and external collaboration. This effort is carried out as a manifestation of higher education in strengthening management and governance so that it has good performance and makes the university a World Class University (WCU). The change in the paradigm of a tertiary institution towards WCU became a fundamental change. This is due to the paradigm that can change the views, commitments, orientation, values, and goals to be achieved by universities. Of course, this paradigm requires a change in vision for
universities. This paradigm also affects the understanding of stakeholders, especially students and lecturers to contribute to improving their ability to build a scientific community internationally. Based on the previous paradigm, the implementation of WCU achievement efforts is influenced by many factors. One factor is that level assessment is highly subjective in tertiary institutions [5]. Based on an international ranking agreement that has been agreed that a university that has received recognition from an internationally reputable institution can be categorized into WCU. The fulfillment of WCU criteria is determined from the achievement strategy by giving more weight to the superiority of a tertiary institution so that it can encourage the use of relevant new criteria. The use of this criterion is aimed at ranking and measuring the performance of tertiary institutions which tend to be volatile. Also, in the ranking process, there are different criteria or indicators in some ranking techniques in the world as a manifestation of performance appraisal of the overall implementation of the organization. Quacquarelli Symonds (QS) is one of the rating agencies that provide an evaluation of the weaknesses and strengths of tertiary institutions and produces an assessment that shows a ranking of achievements. The QS ranking also has six indicators that are believed to be able to describe the value of higher education [2].

2. Method

2.1. Undip performance indicator
Performance indicators are parameters used to measure the success of an organization. Performance indicators are prepared based on vision, mission, and goals. Also, in preparing performance indicators, Undip as a work unit of the Ministry of Education and Culture pays attention to the tasks and functions stipulated in the Directorate General of Higher Education Strategic Plan. Undip Performance Indicator (KPI) is a parameter used to assess Undip's success in one fiscal year period or one leadership period. The indicators and performance targets to be achieved in the 2015-2019 period are divided into four sections according to the number of objectives.

2.2. Quacquarelli symonds (QS)
Since 2004, when it was first compiled, QS has expanded to rank more and more universities. In the 2013–2014 edition, 800 universities are ranked. However, far more (more than 2,000) are assessed. They are compiled using six criteria. Quacquarelli Symonds (QS) method has six indicators in ranking universities throughout the world. The six QS indicators are academic reputation (40%), workforce reputation (10%), faculty / student ratio (20%), citation of scientific articles per lecturer (20%), international lecturers (5%), and international students (5%) [3].

2.3. Integrated performance measurement systems (IPMS)
The IPMS method is one of the methods or systems for measuring organizational performance that is integrated and adapted to the needs of stakeholders [4]. The purpose of IPMS is to describe the main components in the performance measurement system and make the best performance measurement guidelines. The steps needed to measure performance using the IPMS method are as follows:
1. identify stakeholders and manage the list of needs of each existing stakeholder,
2. identifying and comparing companies with external monitors or company competitors engaged in the same field,
3. setting goals of the business,
4. defining the KPI used to measure the level of achievement of business objectives,
5. performing validation, determining the specifications of each KPI,
6. weighting KPIs, and
7. scoring system.
2.4. **Key performance indicator (KPI)**
Key Performance Indicator or KPI is a system or method of measuring critical factors that contribute to the success of an organization. As an achievement measurement tool, it has an acceptable score for determining the measurement stage of an organization to reach the success stage.

2.5. **Analytical hierarchy process (AHP)**
The Analytic Hierarchy Process (AHP) is a general measurement theory used as a Multi-Criteria Decision Making (MCDM) algorithm. Three principles must be understood to solve a problem with the AHP method, namely: decomposition, comparative judgment, and logical consistency.

2.5.1. **Decomposition.** Decomposition is the principle of solving complex problems by organizing into interconnected elements that are described using a hierarchical structure. According to Saaty, the hierarchical structure is a representation of a complex problem that is arranged in multilevel where the first level is the goal, followed by the level of factors, criteria, sub-criteria, and so on down to the last level of alternatives.

2.5.2. **Comparative judgment.** The second step in the AHP process is to assign numerical values to subjective considerations about the importance of each variable. At this stage, there is a paired comparison matrix using numbers to represent the relative importance of another element referred to in the form of a scale of 1 to 9 aimed at considering each level of the hierarchy to a criterion at a higher level [2].

2.5.3. **Logical consistency.** This consistency is very important to obtain valid results. AHP measures the consistency of considerations. The initial step to start this priority is done by calculating the criteria weight (priority vector) by calculating the eigenvalue (eigenvalue) [7].

3. **Research stages**
The research procedure is a set of comprehensive and detailed steps to assist in conducting research and data collection. The first stage begins by identifying the problem, namely identification of organizational level, identification of stakeholder needs, identification of external monitors, identification of organizational goals, and experts or practitioners of PT. The next step is the determination of KPI indicators made adjusted to the indicators that exist in the ranking of QS. The next stage is validation and specification to ensure and describe the KPI indicators used by units, formulas or measurements, frequency of measurements, business activities, targets, data sources, and strategic objectives (objectives). In the weighting stage, a multi-criteria algorithm in the form of AHP is used to select choices, determine assessment criteria, and make decisions. The result of weighting is website-based ranking as material for higher education assessment. Then in the conclusions and suggestions stage contains the results of ranking as a result of the evaluation of higher education performance.

4. **Result and discussion**

4.1. **Identify the organizational level**
The IPMS stage provides a reference model that provides a basic structure of the reference model which consists of four levels, including the following: the business level of the company, the level of the business unit, the level of business processes, and the level of activity.

4.1.1. **Business level.** At the business, the level is Diponegoro University which is responsible for organizing the entire business in an organization and serving the entire process of academic activities.

4.1.2. **Business unit level.** This level consists of several faculties and study programs that support academic business processes.
4.1.3. **Business process level.** Every business process in an organization requires stakeholders to keep the organization in existence. Three business elements in a university are employees, lecturers, and students.

4.1.4. **Activity level.** At this level includes activities carried out by stakeholders in Undip which include the administrative process and teaching and learning process.

4.2. **Identification stakeholder**

Stakeholders are parties who have direct or indirect relations with the company and act as movers and guarantee the existence of a company. Undip stakeholders include: Undip Leader, Quality Assurance Team, Lecturers and Students, Educational Personnel, Tracer Study Feedback, and Graduate Competencies.

4.3. **Stakeholder requirement based on QS**

Internal stakeholders and external stakeholders identify each other's requirement according to the QS method. The determination used to identify this requirement is to conduct interviews with several stakeholders so that 29 requirements are obtained: 8 requirements for academic reputation, 6 for citations per faculty, 2 for employer reviews, 2 for international faculty, 2 for international students, and 5 for faculty-student ratio.

4.4. **Identification of purpose**

The University ranking system uses QS and IPMS methods. The QS method is used to define university ranking based on six main criteria in determining university ranking scores. Whereas IPMS aims to describe and analyze ranking systems by considering the strategic and operational dimensions to be objective. IPMS is also used to measure the level of conformity of targets to be achieved as a result of university evaluations using KPIs.

4.5. **External monitoring**

External Monitoring is carried out to be able to know the weaknesses and strengths to improve organizational performance. This can be done by conducting a comparison or benchmarking process. Benchmarking is done using a questionnaire filled out by people who understand the conditions of the organization being compared. In the results of external monitoring, it was found that 2 requirements still need to be improved.

4.6. **Identify key performance indicator**

The next step is to determine the KPI. Universities have KPI which is an indicator of work assessment which is then linked to the QS method. Based on the QS method, there are six indicators used are reputation, workforce reputation, faculty or student ratio, citation of scientific articles per lecturer, international lecturers, and international students [8].

**Table 1. Indicator and KPI in university**

| Indicator                              | Key Performance Indicator in University                                               | Weight | Rating | Weight x Rating |
|----------------------------------------|---------------------------------------------------------------------------------------|--------|--------|-----------------|
| Academic Reputation                    | Number of (title) research funded by international funding and / or international joint research | 20%    | 4      | 0,8             |
|                                        | Number of educational cooperation (double degree, joint degree, joint supervision, credit transfer/credit earning) with other universities | 8%     | 3      | 0,24            |
|                                        | Number of magister students with publications in accredited / international national journals | 8%     | 3      | 0,24            |
|                                        | Number of doctor students with publications in accredited / international national journals | 15%    | 3      | 0,45            |
| Indicator | Key Performance Indicator in University | Weight | Rating | Weight x Rating |
|-----------|----------------------------------------|--------|--------|-----------------|
|          | Total Intellectual Property Rights (IPR) | 7%     | 3      | 0,21            |
|          | Management support for the ongoing implementation of tasks and functions | 8% | 3 | 0,24 |
|          | Number of lecturers involved as speakers in international seminar activities | 6% | 3 | 0,18 |
|          | Availability of security, work safety, and environmental facilities | 5% | 3 | 0,15 |
|          | Number of leading centers/ research center/ education center/ IPR centers | 6% | 3 | 0,18 |
| Citation per faculty | Number of lecturers with publications in reputable international journals | 20% | 4 | 0,8 |
|          | Number of publications in reputable international journals | 14% | 4 | 0,56 |
|          | Number of lecturers involved in IPR works | 10% | 3 | 0,3 |
|          | Number of lecturers involved in research with international funding / joint research with international funding | 8% | 2 | 0,16 |
|          | Number of reputable scientific journals indexed by international databases | 15% | 4 | 0,6 |
|          | Number of publications in international proceedings | 10% | 4 | 0,4 |
|          | Number of students interning in companies / industries / agencies | 15% | 3 | 0,45 |
|          | The amount of community service with international funds | 12% | 3 | 0,36 |
| Employer Review | The number of professors | 15% | 3 | 0,6 |
|          | Number of professors with reputable international publications | 10% | 2 | 0,1 |
| International Faculty | Number of international students | 14% | 3 | 0,42 |
|          | Number of study programs offering international programs | 12% | 3 | 0,36 |
| International Students | The ratio of the number of lecturers to the number of students | 20% | 4 | 0,8 |
| Faculty Student Ratio | Ratio of accepted S1 students / registrants | 10% | 4 | 0,4 |
|          | Number of lecturers participating in the sabbatical / postdoctoral (foreign) program | 10% | 3 | 0,3 |
|          | Number of lecturers invited by domestic institutions / foreign | 8% | 3 | 0,24 |
|          | Number of S3 / Sp2 qualified lecturers | 10% | 4 | 0,4 |

4.7. Validation of key performance indicators
KPI validation is done after the KPI has been identified, which aims to find out whether the performance indicators designed are truly by Undip requirements to measure its performance, namely by checking whether there are indicators that are not yet listed or there are indicators that do not need to be included because they have similarity/similarity with other indicators. KPI validation is carried out by returning these indicators to top management who truly understand the existing system at Undip.

4.8. Weighting with AHP
From the results of the identification of KPIs at PT. XYZ obtained 29 Key Performance Indicators (KPI). Then the KPI will be made into a pairwise comparison matrix. The preparation of the hierarchy is the first step to defining complex and complex problems so that they become clearer.
Figure 1. Criteria AHP hierarchy

After the hierarchy of criteria is known in the AHP, the weighting is done by making a pairwise comparison matrix. After weighting using the AHP method we get the weight of each criterion as follows:

Table 2. The weight of each criterion

| Criteria               | Weight |
|------------------------|--------|
| Academic Reputation    | 2.87   |
| Citation per faculty   | 2.82   |
| Employer Review        | 0.81   |
| International Faculty  | 0.7    |
| International Students | 0.78   |
| Faculty Student Ratio  | 2.14   |

Based on the results of the priority weights in the table above it is known that the academic reputation criteria are the highest priority weights which means that academic reputation has a very big influence in determining organizational performance. Undip considers that universities prioritize improving performance on academic reputation criteria as a key to organizational performance without having to reduce attention to other criteria. The following are the results of the overall weighting of the sub-criteria:
5. Conclusion

Based on the results of company performance measurements using the Integrated Performance Measurement System (IPMS) method conducted by Undip, it was concluded that the indicators that influence Undip's performance were 26 indicators divided into 6 perspectives. The weight of interest for the QS World University Ranking assessment criteria which has the highest weight is academic reputation, citation of scientific articles per lecturer, faculty/student ratio, workforce reputation, international students, and international lecturers.

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