WCETR 2011

Measuring human performance using annual work target evaluation system

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Abstract

Nowadays, high or upper level of some business and operative management need to know how the performance of the staff. In addition, the human performances can be measured through its quantitative elements in order to obtain its qualitative measurement. Annual Work Target Evaluation System (AWTES) is a system that can be used to measure the human performance, thus an organization's target in some area of its business can be monitored too. Currently, Faculty of Computer System & Software Engineering (FCSSE) deploys a system where it can evaluate the performance of the staff. However, the higher level management cannot view the progress on the results in more effective ways such as via the graph or chart. Therefore, the development of AWTES is necessary to predict and monitor the organization performance using generated graph so that their performance are more effective to be view by the high level management. The methodology that is implied in the project development is the Iterative and Incremental Development Methodologies. This prototype has 6 modules and able to evaluate the performance based on quantitative elements which can be set by the user. AWTES is developed by using the Adobe Dreamweaver CS4 and NetServer. By using AWTES, it helps the management of the department to know the performance of their staff and furthermore improves an organization performance.

Keywords: AWTES, KPI, quantitative, performance

1. Introduction

Human performances are very subjective to be measured. However, there is a formula on how we can measure the performance of a person based on its quantitative elements and gets its qualitative measurement [1]. The qualitative elements will be measured by how far the achievement of their target compare to the actual achievement and there will be a scale of quality. There are two-level of how we want to measured it which are the first-layer is comparison between quantitative achievement and then the second-layer is going more details on how their achievement give impact on their field of task. The human performance affect the effectiveness of faculty's management especially its governance element. In other scopes, faculty's governance structures influence the performance of high level management of universities. Hence, there is a critical need to identify, assess, compare and contrast key performance indicators for each faculty in public universities. Annual Work Target Evaluation System (AWTES) is a web application that will manage, records, and organize all the data that is related to the KPI measurement. This system actually help the high level management in the faculty's governance to view and analyze the performance of their staff more systematically based on previous records data in the system.

Nowadays, high or upper level of some business and operative management need to know how the performance of their company. However, the process of compiling the source of the KPI is quite difficult and some of the

department still using the manual source such as filing and documentation process using paper and form. Through the manual process, it is difficult to view the performance of the company such as performance graph, chart and all the quantitative elements. Measuring KPI is quite difficult because its needs an expert to formulated the specific measurement because performance may different for each individual. In this situation, AWTES plays a main role in some organization that needs to be contending with tight schedule, annual work target and highly effective staff. The objectives of this project include: (1) develop a web-based application prototype of AWTES; (2) measures the performance of productivity of department based on qualitative (using scale) and quantitative elements.

They are several elements have been considered as the scope of this projects, which are User, System and Database. This element is important to make sure that the scopes of the system did not override the boundaries of the system.

For the user scopes elements, Table 1 shows the scopes of the user involved. This system is a web based application. It can be accessed via the Internet so that the management can view the progress of the faculty's everywhere. It has security elements whereas only authorized user can view the content of this web based application. In database framework, its contains a few tables that record the data, history, information, staff details and annual work target that can be accessed and update by high level administration of faculty only.

Table 1: User's scopes of the system

PYD (Appraisee)	PPP (First Appraiser)	PPK (Second Appraiser)
Key-in the Annual Work Target (AWT) in the system and update the AWT based on current performance as a record.	View the analysis performances of the staff under their department and evaluate KPI based on current performance and department target/goal.	View the analysis performances of the KPI based on current performance and department target/goal. Evaluate the staff by giving marks (scale) and give suggestion or comments on specific individual or target.

2. Related Works

Based on the research that has been conducted by the National Higher Education Research Institute (IPPTN), there a few important elements that will relate to the development of this proposed system. IPPTN defined the university governance as the structure and process of authoritative decision-making across issues that are important to internal and external stakeholders. Within a university the governance structure includes an active governing body with adequate autonomy to assure institutional integrity and to fulfill its responsibilities of policy and resource development, consistent with the mission and vision of the institution. The IPPTN Malaysia made a research methodology both qualitative and quantitative methods for the collection of descriptive data on Key Performance Indicators (KPIs) for governance of public universities in Malaysia. The study involved 8 Vice-Chancellors, 12 Deputy Vice-Chancellors, 5 Registrars, 5 Bursars, 72 Deans and 276 Senior Academic Staff as respondent [2].

2.1 A Study on Existing Systems

In this section the studies of the conventional method and current system are presented. Currently, the system that had been used at Faculty of Computer System and Software Engineering (FCSSE) University Malaysia Pahang (UMP) is divided into 3 main departments which are Administrative Department, Academic Department and Technical Department. Academic Department has four different programs/courses which are lead by head of program for each program. The four academic programs are Software Engineering, Computer System & Networking, Computer Science and Graphics Multimedia Technology. Each of staff in every department will be evaluated by two assessment officer which is First Appraiser Officer *(Pegawai Penilai Pertama – PPP)* and Second Appraiser Officer *(Pegawai Penilai Kedua – PPK)*.Head of each department will be a First Assessment Officer to all the staff under their department. Meanwhile, the Dean or Deputy Dean will be a Second Assessment Officer for the staff. The current system that being used at FCSSE able to measured and records its KPI by using the computerized system that is integrated with the University's Integrated Management System (IMS) and University's portal (E-comm). All the FSKKP staff prepares their individual Annual Work Target (AWT) to be parallel with the faculty's KPI. This data will be inserting into the system for records and references. PPP and PPK will give marks for the staff based on their performance and AWT which is measured by 1-10 scale for qualitative elements. For

once every year, the staff will be able to view their marks or performances based on the evaluation process for previous year.
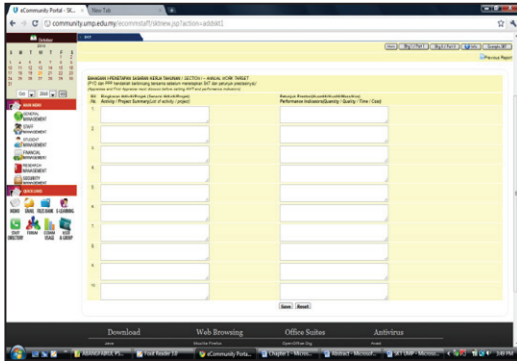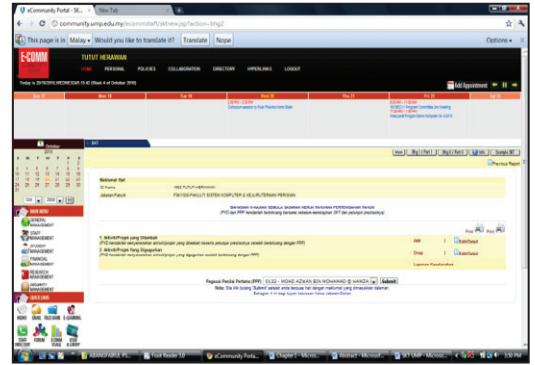

Figure 2: Input Annual Work Target

Figure 3: Interface of Existing System

2.2 Qualitative AWT Calculation

An AWT is a target, which is an exact value that the KPI should achieve [3, 4, 5]. It can also have ranges against which to track the KPI. Ranges can be either a percentage of the target value or an actual value. For each range, the value of the scale had been set in its library. Below is the example of the qualitative scale from the IBM performance evaluation [6]. If staff KPI is "Average time for response to a customer call" and the target is "less than one minute," then the staff might decided not to set an exact target. Instead, the staff might set several ranges as follows:

Table 2: Average time for response to a customer call

Start value	End value	Name
0	30 seconds	Excellent
30 seconds	1 minute	Good
1 minute	2 minutes	Fair
2 minutes	10 minutes	Poor

3.   Methodology

The methodology that deploys in the project development is the Iterative and Incremental Development Methodologies [7]. Firstly, ensure that high quality systems are delivered. Second, provide strong management controls over the projects. Third, maximize the productivity of the systems developer. The Iterative and Incremental Model developed in response to the weaknesses of the waterfall model. We also can say that this model is the modified model of the Waterfall Model. It starts with an initial planning and ends with deployment with the cyclic interactions in between. The basic idea is to develop a system through repeated or iterative cycles and in smaller portions at an incremental time, allow the project management and the developer to take advantage of what was learned during the development of earlier portions or versions of the system. Learning comes from both the development and use of the system, where possible key steps in the process start with a simple implementation of a subset of the software requirements and iteratively enhance the growing versions until the full system is implemented. Each iteration design modifications are made and new efficient capabilities are added [8]. This methodology allows a potential of reaching the design goals of a client which the requirement is still not clear. The reasons we chose Iterative Methodology because it easy to roll-out new functionality in stages, obtain rapid feedback from actual users, can design flaw discovered quickly, great productivity and very little knowledge loss between phases. If I receive feedback at early stages in the overall development process, changes in requirements can be more easily incorporated into the finished product.

Based on the proposed project AWTES, annual work target is an element which is difficult to measure its qualitative factors. Sometimes, the requirements and the measurement scale of the annual work targets are changing based on the company situation and decision made by higher level of management [3]. Therefore, AWTES consider the performance calculation based on quantitative progress and quantitative impact. AWTES measure the human performance based on the following equations:

$$Total\ Quality\ Impact\ Value = Total\ No\ of\ KPI\ X\ Highest\ Quality\ Impact\ Value \qquad ...\ (1)$$

$$Total\ Quality\ Mark = Weightage\ \ X\ \frac{Total\ Evaluation\ Impact\ Value}{Total\ Quality\ Impact\ Value} \qquad ...\ (2)$$

$$Total\ Quantity\ Impact\ Value = Total\ No\ of\ KPI\ X\ Highest\ Quantity\ Impact\ Value \qquad ...\ (3)$$

$$Total\ Quantity\ Mark = Weightage\ \ X\ \frac{Total\ Evaluation\ Impact\ Value}{Total\ Quantity\ Impact\ Value} \qquad ...\ (4)$$

$$Final\ Mark = Average\ Evaluator\ Mark + Total\ Quality\ Mark + Total\ Quantity\ Mark\ ...\ (5)$$

Annual Work Target data sometimes will be changed between the periods of time. Taking into accounts on these issues, the iterative and incremental development methodologies will be used to help me developed this project to avoid the difficulties in changing the project in the last phase of development. AWTES is designed to interact with the database by using Entity Relationship Diagram (ERD). This database design is most frequently used because it generates a simple data form for each relation and for many-to-many relationships [9, 10]. A database management system allows an organization to structure its information so those users can retrieve data in a dynamic manner as well as to prevent users against unauthorized access [11, 12, 13]. Data dictionary KPI Maps has been designed to store the summary of the system such as annual work target, staff information, performance and etc. Meanwhile business process modeling is the important aspects in software system design [14, 15]. AWTES models its business process using Data Flow Diagram (DFD). Figure 5 shows the Context Diagram of DFD for AWTES.
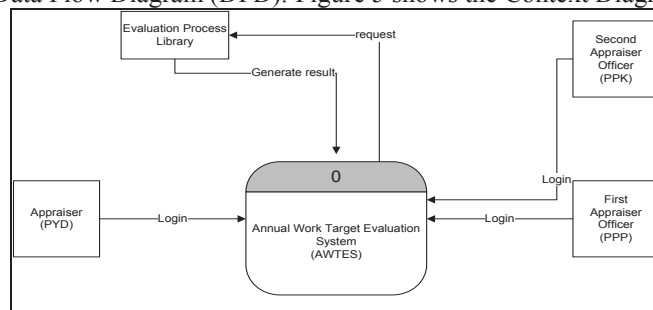

Figure 5: Context Diagram for AWTES

AWTES system will have 3 main user of the system which is have different module. Appraiser, First Appraiser Officer and Second Appraiser Officer will have to login first in the system. PPP and PYD will have the evaluation module in their system where all the data will be retrieved from the database and AWTES will refer to the library that contains all the information about the calculation performance of the staff.

4. Implementation

In this section, we show the implementation of AWTES. There are 6 modules which are Annual Work Target Goal Setting, AWT Review, Actual Achievement, Visualize KPI Data, Appraiser Dashboard and Evaluation Process (see Table 3).

Table 3 Explanation of the System Interface

Modules	Details
Section I – Annual Work Target Goal Settings	This feature is used for the staff to insert their annual work target. This annual target will be submitted to first appraiser.
Section II – AWT Review	In AWT Revision, staff able to review back their target for references and can update (whether to add or drop out the current annual work target).
Section III – Actual Achievement	Insert the actual achievement in the appraisal year

Visualize KPI Data	This module visualizes the data for the staff in a graphical way (bar, pie chart etc.) so it is easier to analyze.
First Appraiser Dashboard	This module is used by the staff that had been assigned as the First Appraiser or PPP.
Evaluation Process	Evaluation process is used only for the staff that had been assigned to be a first and second appraiser.

Figure 6 depicts the AWTES interface to be used by all the staff including the Appraiser and the First Appraiser. Thus, the user can view their annual work target status and view the performance that had been evaluated.

Figure 6: Interface of the system (Staff)

By using this system, the staffs include the first and second appraiser knows which area is their goal settings are at the optimum level. For example, for staff in *DS52 grade* (senior lecturer), their annual target should be focus on Research and Education Category. Through the visualization of data, it is easier for them to monitor their performance.

Figure 7: Monitor the total of quantitative elements of annual work target.

5. Results and Discussion

KPI Maps is developed using software *Adobe Dreamweaver CS4* and *NetServer, PHP My Admin* as its database. The system was fully implemented in *php scripting* with *SQL* codes to manipulate the database. KPI Maps has been successfully developed and tested in the single client server environment. The system is capable of:

a) Record the staff information
b) Retrieve the data of the staff information.
c) Generated a graph for statistical data

    d)   Calculating the annual target performance.
    e)   Colouring indicator for annual target progress.
    f)   Summarize and generate a report.

Figure 8 shows the AWTES calculate the percentage of the annual work target had been achieved. From Figure 7, AWTES helps the staff to view how many percent of their work target already achieved. This is to make sure that they are knows at which level are their performance at the current time. As an example, when the staff are targeted to published a 4 journal for one year, but the actual achievement is only 2 journal had been published, the system will show a bar graph indicator that the achievement of the specific annual work target are only 50%.

Figure 8: Results and Summary

6. Conclusion

AWTES use Iterative and Incremental Model methodology since the requirements and the measurement scale of the KPI are changing based on the company situation and decision made by higher level of management. This is due the benchmark of the performance can be track and identified. Overall, the project has achieved its objectives. By applying all the engineering processes it makes the product better in term of development and maintenance. Through the AWTES development, hopefully it can help the management of the faculty to monitor their staff performance effectively.

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