A Case Study on Evaluating Project Achievement of ITSP Implementation

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Summary
Nowadays, Information Technology Strategic Planning (ITSP) was developed by most of the organization. The plan basically emphasized on information technology (IT) goal and strategy for the next few years. The aim was to justify IT contributions towards efficiency, effectiveness and competitiveness. The plan also comprise of associated IT projects to achieve the planning strategies. Previous study has concluded that most of the strategies formulated were fail to achieve. The strategy accomplishment was reflected by the projects achievement. Therefore, measuring ITSP implementation is important to justify the achievement of the planned projects. The focus of this paper is describing the proposed Performance measurement Framework on evaluating projects performance of the ITSP implementation. This paper also report on the framework testing on the real case study to identify its applicability and measurability.

Key words:
ITSP Implementation, Performance Measurement, Project Achievement.

1. Introduction

Based on the effort, time and budgets allocate on implementing the ITSP has lead the organization to justify their achievement. Evaluating the accomplishment of the project involved within the ITSP could facilitate for (i) reviewing the progress of the activities, (ii) using methods on measuring the results and accountability, and (iii) offer continuous improvement of the performance target. The measurement is important to know the efficiency and effectiveness of the IT [1]. The focus of this paper is to report the findings from the on-going study on proposing the evaluation process to measure the project achievement of the ITSP implementation.

The next section of this paper reports literature study on ITSP implementation, project success, and briefly on the proposed framework. The third section describes the case study and the evaluation process. Then, fourth section explains on the case study and results obtained. The final section concludes the paper and provides suggestion for future research.

2. Background

2.1 ITSP Implementation

Variety of meanings is given to 'implementation' in the literature [2]. The implementation stage important to summarize, organize, and view the development of implementation process [3]. IT implementation process model by Lai and Mahapatra (1997) comprise implementation as: a) 'an attempt to install and deliver IT in the adopter's organization', b) 'resources are expanded to affect the application of new IT', and c) 'assessment is made of the extent to which the IT was actually used, delivered, or carried into effect'.

ITSP model suggested by Boar [4] involved three main processes: assessment, strategy development and plan execution. The plan execution process is putting plan into action and including the project evaluation. Strategies are made operational through implementation programs that are portioned into multiple projects.

Fahmy et al. [5] has suggested five main phases for the ITSP. In general the phases involved are related to the organization infrastructure and IT resources allocation. The implementation phase addressed the strategy execution into operation according to the priority. Hence, the additional phase was evaluation and control to monitor the strategy implementation to ensure it matches with the predefined set of standards.

The ITSP implementation in this study is defined as the process of adopting the formal plan into action, and to apply the action plan towards the focus on the project schedule, resources allocated, and operational level based on the predefined set of standards.

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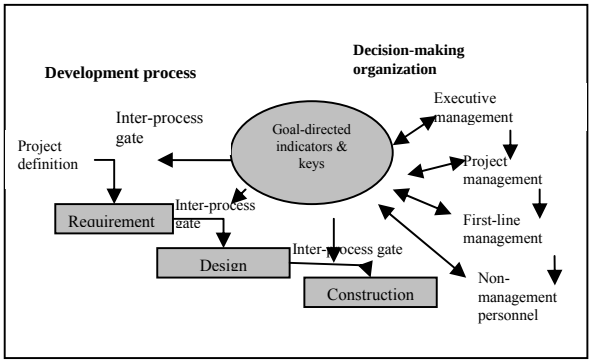
2.2 Project Success

The ITSP was developed for the process of IT management and responsible for the implementation throughout the overall organization. Implementing performance measurements and evaluation will help the company to evaluate the progress of the project activities, formulate certain results and accountability and constant improvement of the performance goal. The measurements are important for the organization to know how effective and efficient the IT is performing [1]. In other word, to know how the organization are 'doing the right things' and 'doing things the right way'.

Literature studies on describing project success are identified in various perspectives. Wateridge [6] reported that the key criteria of IT project success are to have a clear agreement at early stage of project, and reviewed performance during the project progress. Besides the project manager, perspectives on time, budget and user criteria, the user perceptions of success and failure also need to be satisfied.

An effective management of the software development projects was highlighted by Nguyen [7] on the development process mapping. The process is simplified into four phases: project definition (feasibility); requirements; design; and implementation. The used of goal-directed indicators and keys (Fig. 1) involves organizational mapping between the development process and decision-making.



Fiq. 1: Processes and Organization Mapping
Source: Nguyen 2005

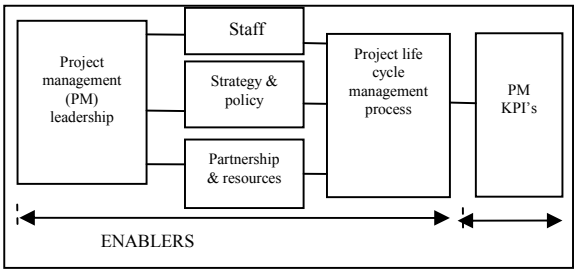
Turner and Müller [8] have discussed the manager's leadership style as a success factor on projects as shown in Table 1.

Table 1: Project Success Factors

Success factor	Description
Project mission	Clearly defined goals and direction
Top management support	Resources, authority and power for implementation
Schedule and plans	Detailed specification of implementation
Client consultation	Communication with and consultation of all stakeholders
Personnel	Recruitment, selection, and training of competent personnel
Technical tasks	Ability to the required technology and expertise
Client acceptance	Setting of the final product to the end users
Monitoring and feedback	Timely and comprehensive control
Communication	Provision of timely data to key players
Troubleshooting	Ability to handle unexpected problem

Source: Turner and Müller 2005

Project Management Performance Assessment (PMPA) model was proposed by Bryde [9]. The model included six criteria for assessing project management performance: leadership; staff; policy and strategy; partnership and resources; project life cycle management processes; and key performance indicator. The PMPA model (Fig. 2) categorized the performance criteria into 'enabling' criteria and 'result' criteria.



Fiq. 2: The PMPA model
Source: Bryde 2003

The project management maturity by Standing et al. [10] includes the needs of a particular training and experience, role of the members, and other factors. The characteristic of the IT project management maturity was based on an IT professional's perspective. However, each project may evolve and follows certain development methodology. By the time measurement of the project success is measured the most suitable measurement is based on the project progress. Therefore, measuring the performance of the related projects based on the development stage was not covered in the model.

Other dimensions of project success based on the literature studies by Chan and Chan [11] was summarized as a consolidated framework. Those factors was based on the literature study conducted may be helpful to measure the performance of the project either project on progress or completed.

Literature study on the ITSP implementation shows that measuring the performance may help to indicate the efforts and resources is well managed. Developing appropriate measures is important and will depend upon the activity to be measured. Performance measures are also intended to communicate to the organization, what is important or necessary for success, and should be developed by those responsible. The Key Performance Indicators (KPI) should be linked to strategies identified in the ITSP.

In this study the measurement of the project success refers to the perspectives of the IT infrastructure. The measurements of the KPI comprise of the five variables: hardware, software, people and skill, network and communication and procedure. The details of the study on the KPI formulation were documented separately.

3. The Proposed Performance Measurement Framework

The previous work of Fane [12], Ittner and Larcker [13], Crandall [14], Corrigan [15], Neely et al. [16], Parker [17] and Roberts [18] point out the importance to indicate the appropriate performance measures to quantify success. The performance measurement framework of Mc Gill [19], Markless and Streatfield [20], Mendonca et al. [21], and Kaplan and Norton [22] [23] [24] were the basis of the performance measurement architecture. As shown in Fig. 3, the proposed performance measurement of the ITSP implementation comprises of three main components: the Information Technology Key Performance Indicators (ITKPI) Model; Performance Analysis and Performance Measurement Repository as part of the application tool.

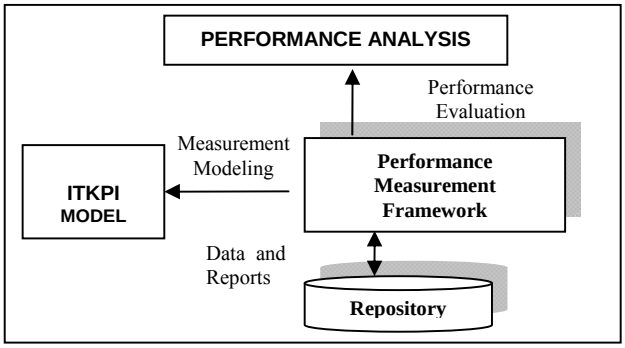


Fig. 3: Performance Measurement Framework

3.1 ITKPI Model

The foundation of the ITKPI components are based on the definition of the IT and IT infrastructure from the literature and supported by the exploratory study of the ITSP documents. The outcome of the study has been reported separately in other research publication.

Fig. 4 depicts the basic structure of the proposed ITKPI for measuring ITSP projects performance. The variable of the ITKPI is divided into five: a) Software, b) Hardware, c) People and skill, d) Network and communication, and e) Procedure.

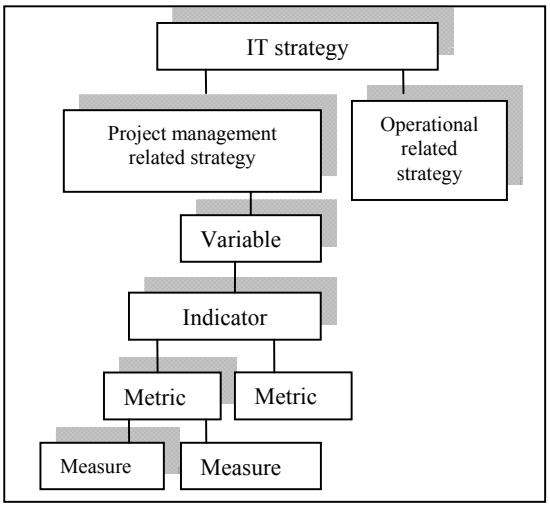


Fig. 4: Basic Structure of ITKPI Model

The definition and purpose of the ITKPI components is described in Table 2.

Table 2: ITKPI Components and Definition

Component	Definition and purpose
IT strategy	The strategy that is related to the ITSP implementation.
Project management strategy	The metrics for the project management includes the cost and schedule of the project metrics based on the evaluation of budgetary requirements, time and organizational constraints, human resources, management and plan coordination. To indicate the achievement/s based on the project development.
Operational-related strategy	The operational metrics is to clarify and express the functional elements of the systems, hierarchies, responsibilities of the organizational structure, and technical architecture.
Variable	The infrastructure of IT refers to the perspectives of the software, hardware, IT human factors and skill, network and communication, and procedures.
Indicator	The measurement for variable to indicate the achievement/s. Each variable was influence by the indicator that

	represents the achievement from the performance score given for evaluation.
Metric	Each indicator may have particular aspect for measuring the performance based on the metrics allocated.
Measure	The expected measures guides on the performance score will be given.

Type of Variable

The performance of the ITSP implementation is measured based on the performance of each variable. However, the ITKPI model considers the type of the variable, which is divided into two: the global variable and local variable. Table 4 gives the description of the variable.

Table 4: Type of Variable

Category	Description
Local	The performance of the local variables influenced by the global variable.
Global	The global variable may affect the performance of the ITSP implementation on the procedures of the organization and management practice.

The local variables are software, hardware, people and skill, and network and communication. Procedure is considered as global variable that includes the organization's procedure, management policies and guidelines.

The local variable is influenced by the procedure because the IT department or activities are part of the organization. Since most of the IT policies were established and bound by the agreements between the top management of the IT managers and other functional areas, so it is considered as the global variable.

3.2 Project Development Stage

The development of any project may follow certain development approach. To simplify the varieties of existing project management approach, the project development life cycle is divided into four main stages. The stages are modified from Murch [25]. The descriptions of the activities involves in each stage are as follows:

Stage 1 – Project planning
In this phase the activity involves are related to the project definition, planning and estimation. The activities involved are reviewing the current status of the system and identify the business objectives and information strategy. Next, conduct a survey on the information needs, expected hardware and software environment. Then, develop conceptual design, confirms the use of the software packages used. Finally, the development alternatives will be applied and finalize project work plan.

Stage 2 - Analysis and design
The activities involved are identifying and describing user requirements, identify and analyze the quality requirements, deepen the understanding of system requirements, create and iterate a description of the new business process, create the model and events and data requirements.

Stage 3 – Development
The purpose of the development phase is to complete the detailed design and to build the system. The activities involved are realizing the detailed design agreed upon and programmer writing the code, debug, and deliver for the testing. The output of this stage is an executable code for the application.

Stage 4 – Implementation (test and roll out)
In this phase a comprehensive plan for the test activities and the system is processing correctly is developed. The activities involved are design the testing approach, the test plan of the specific testing, and create system test model.

The above description of the system development phase was applied as the guidance to allocate the project development stage. The related indicator and metric for each variable and project development stage are as shown in Table 5.

Table 5: Metric for the Project Development Stage

Variable	Indicator	Metric	S1	S2	S3	S4
Software	Project progress	Milestone/project deliverable	√	√	√	
		Work unit performance	√	√	√	
	Usage and maintenance of applications/ tools	Physical size			√	
		Functionality size			√	
		Modification of package			√	
		Technical and configuration support	√	√	√	√
		Consultancy support	√	√	√	√
	System quality	Functionality support				√
		Efficiency				√
		Portability of combination				√
		Usability				√
		Dependability				√
		Reliability				√
		Responsiveness				√
Hardware	Technology effectiveness	Stability	√	√	√	√
		Impact	√	√	√	√
		Availability	√	√	√	√

	Selection and acquisition	Qualified vendors			√	√
		Expected delivery			√	√
Network	Administration	Reliability	√	√	√	√
		Maintenance	√	√	√	√
	Resources	Capacity	√	√	√	√
		Delivery	√	√	√	√
		Coverage	√	√	√	√
		Infrastructure connectivity	√	√	√	√
	Communication channel	Information rich environment	√	√	√	√
		Enhancement of knowledge and expertise	√	√	√	√
		Improved communication	√	√	√	√
People	Personnel management	Effort	√	√	√	√
		Productivity	√	√	√	√
		Staff experience	√	√	√	√
		Match skill with task	√	√	√	√
		Retention	√	√	√	√
		Staff turnover	√	√	√	√
		Team involvement	√	√	√	√
		Senior management support	√	√	√	√
	Training/skill development	Career path	√	√	√	√
		Training program	√	√	√	√
		Recognition of achievement	√	√	√	√
	Communication skill	Interpersonal skill	√	√	√	√
		Oral communication	√	√	√	√
		Writing skill	√	√	√	√
		Interactive conversation	√	√	√	√
	Customer satisfaction	Knowledge involvement	√	√	√	√
		IS staff service/relation	√	√	√	√
		Information product	√	√	√	√
Procedure	Reporting	Optimal procedures	√	√	√	√
		Frequency of reporting	√	√	√	√
		Escalation procedures	√	√	√	√
	Change procedure	Issue/change documents	√	√	√	√
	Standards and deliverables	Agree on acceptance criteria	√	√	√	√
	Policy of management	Review of policy and ICT service	√	√	√	√
	Policy of procurement	Service level agreement	√	√	√	√

Key: √ is the related metrics concerned for the measurement.

3.3 Performance Evaluation

Besides ITKPI model, the proposed framework also includes measurement analysis on measuring performance of the ITSP implementation. The Weight Scoring Method (WSM) was adopted from the ideas of Kontio [26] [27] and Hampton and Quinn [28]. However, the weight calculation has been changed based on the performance evaluation of the framework. Besides weight calculation, the formulas for evaluating the performance of the overall ITSP implementation were also suggested. In this section, the related performance measurement evaluation will be discussed in detail.

Weight Calculation

The score given in the assessment form are converted into weight form to represent the importance. The calculations of the weighting are on the strategy importance to the ITSP implementation and the project importance to the strategy achievement. The performance evaluation (PE) of the ITSP implementation can be viewed as the following perspective.

Variable Contribution

The variables may contribute to the project management and operational activities. Therefore, the variable is considered contributing to the project management and operational performance. All the performance score of each variable is evaluated to justify its contributions to the ITSP implementation (Fig. 5).

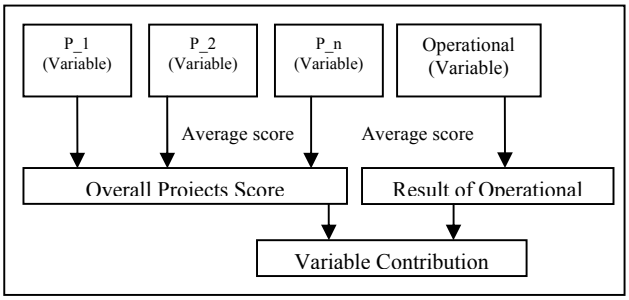


Fig. 5: Variable Contributions

The variable contribution was calculated by accumulating all the data provided for the whole projects (P) involved and operational score.

Project and Operational Performance

The performance of each project is influenced by the variables (including the local and global variables) performance of the related project (Fig. 6).

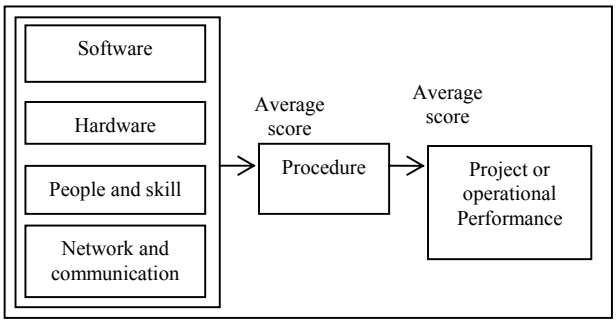


Fig. 6: Projects and Operational Performance

Strategy achievement

The strategy achievement is obtained from the performance of all projects involved (Fig. 7). Each strategy (S) achievement may relate to one or more projects. Thus, the achievement of the related project (P) is summed by taking into consideration project weight to the strategy achievement.

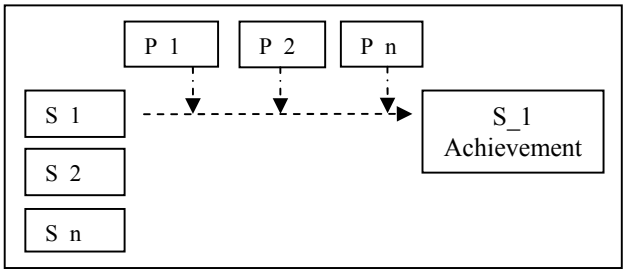


Fig. 7: Strategy Achievements

Achievement of ITSP Implementation

Achievement of ITSP implementation is based on the overall strategy and project achievements (Fig. 8). Measuring achievement of the ITSP implementation includes the overall achievement of all the strategies by the projects and operational performance.

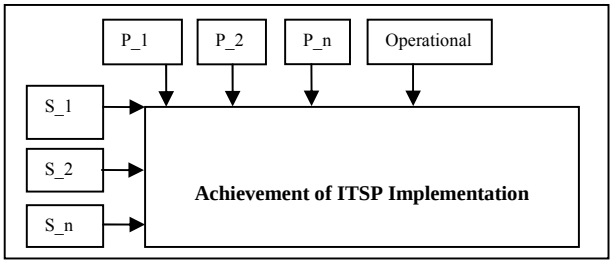


Fig. 8: Performance of ITSP Implementation

The results of the ITKPI obtained will designate the performance level (PL) of the ITSP implementation (Table 6). The performance evaluation provided is flexible and can be adjusted depending on the organization.

Table 6: Performance Level

Performance	Scale of 1 to 5	Percentage (%)
Poor	0 <= PE < 2.0	0 <= PE < 40
Average	2.0 <= PE < 3.0	40 <= PE < 60
Good	3.0 <= PE < 4.0	60 <= PE < 80
Excellent	4.0 <= PE < = 5.0	80 <= PE <= 100

3.4 Evaluation Process

The proposed process of performance evaluation consists of four main steps. The evaluation process is a sequential approach and each process consists of several related activities. Each activity required the related input to ensure the outcome is generated. The related activity of each step will be explained next.

Step 1 – Information and Data Gathering (IDG)
In this step the focus is to identify the related IT strategy and project involved. The information regarding IT strategy is very important for the evaluation. Therefore, the ultimate achievements of the plan will be based on the strategy achievement. The activities are:
IDG 1: Specify the IT strategy involves
The strategy achievement may give different impact to the ITSP implementation performance. This activity may list out the IT strategies for the next activity.
IDG 2: Specify the score of importance for each IT strategy to the ITSP achievement
The management (or evaluator) will need to indicate the score for each strategy. The score is then converted into the weight to represent the importance of the IT strategy to the ITSP success.
IDG 3: The list of IT project involves
The on-going project involved in the ITSP is needed to indicate the weight of each project to the IT strategy.
IDG 4: The weight of each project to the strategy achievement
The weight of each project based on each strategy is useful for calculating the project performance towards the strategy achievement. The range 0 and 5 represents the importance value of the projects to the stated strategy from not applicable (0) to the highest (5).
IDG 5: Indicate the performance score
The next activity is indicating the scoring of each and related performance indicators and metrics for

performance evaluation. The scale required is between 1 and 5.

Step 2 - Mapping and Cause-and-Effect Relationship (MCR)
The interaction mapping and cause-and-effect relationship was applied to allocate the interrelationship between the variables. The representation of the mapping and the relationships is useful to capture the management team point of view on the related strategy; project involved and selected measures or metrics.

Step 3 - Calculating Performance (CP)
The data gathered from the first step and the mapping of the performance variables involved will be used to calculate the achievement of the projects.
CP 1: The importance of the IT strategy to the ITSP achievement
The given score in step 1 is converted into a weight form that shows the importance of the strategy to the ITSP achievement. The scores represent the strategy importance to the ITSP success.
CP 2: The importance of each project to each of the IT strategy achievement.
Each project may provide different impact to the strategy and one project may relate to more than one strategy. The total weight for the projects can be summed for the total performance of the project. The report also can be prepared for each project.
CP 3: The score of each variable to each project.
Each variable may gives different impact and importance to the project achievement. The score for each variable represents its importance to the project. The given score is converted into a weight form that shows the importance of the variable to the project.
CP 4: Performance score for the metric
The scale of performance for each metric of the variable is between 1 and 5. The scale is representing the achievements of each metric. Each of the perspective of IT will be evaluated and were based on the appropriate value of scoring for each variable. The management will need to provide values and then will be converted into weight form for each related variables.

Step 4 – Comparing with the existing performance measures (CPM)
From step 3 above, we can identify the on-going project progress (actual progress). The comparison between the expected results is needed to identify the progress of the plan implementation. The scoring from the variables will help to identify the weaknesses and opportunity exists within the plan implementation. Concentrating on the lowest variables score can reduce the gap between targeted plan and actual progress. The purpose of this step is to (i) Identify the on-going project progress, (ii) Report the result of the project progress based on the score obtained, and (iii) Compare the actual result and the targeted plan.

4. Case Study

The focus of Case X on ITSP implementation are related to the national importance, electronic government, industry standards, information base organization, and customer satisfaction. The technique and approach applied to achieve the main focus was related to the inter collaboration between department, unit and agency; good working procedure, integrate and efficient; produce product that satisfied the market; fulfill the organization establishment, and customer, staff and management friendly.

The technology infrastructure proposed in the ITKPI model was not included on evaluating ITSP implementation at Case X. It is hoped that the proposed framework improves the organization's evaluation on measuring the performance of ITSP implementation.

4.1 The Existing Performance Measures

The existing performance measure includes the combination of performance index on the organization and community. The internal effectiveness based on the Case X's project. The project successfulness based on the target and milestone of each project is achieved.

Performance measurements at Case X concentrates on measuring progress related to project performance. There are five projects involved in achieving the ITSP. For the purpose of confidentiality the projects named as A, B, C, D and E. The existing methods on measuring performance at Case X involve the project milestone. The projects performance was measured based on the existing project activities outlined by the project manager and organization's committee. The time based is one of the important factors on evaluating project progress. The performance measurement of the project such as time based, milestone, schedule and cost are the basics of the project management.

ITSP implementation issues of Case X are related to the following factors: a) the human factor, b) human resources constraints, c) ICT staff appreciation, d) ICT environment, and e) business and technology changes strategy. The business development issues and strategies were listed based on the ranking of importance and the proposed indicators of the research of the Case X. However, the study on the ITSP documentation and discussions found

that the realization of the ideas is still undiscovered by Case X.

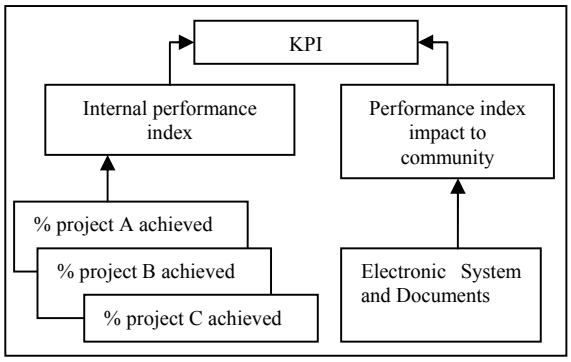


Fig. 9: Existing Structure of KPI at Case X

4.2 The Result

The existing performance measures were used to view the overall project progress such as the budgeting, project scheduling and milestone, and allocation of the team members. However, the measurement of the overall project performance for the ITSP implementation was not covered by the organization. The performance evaluation was made within the project management. There are no such measurement been done for the operational activities.

The results of the project performances are between 3.3 and 3.38. The results are considered average since all the project is still in progress such as analysis and design (Project A, C and D) and development (Project B and E) as shown in Figure 10.

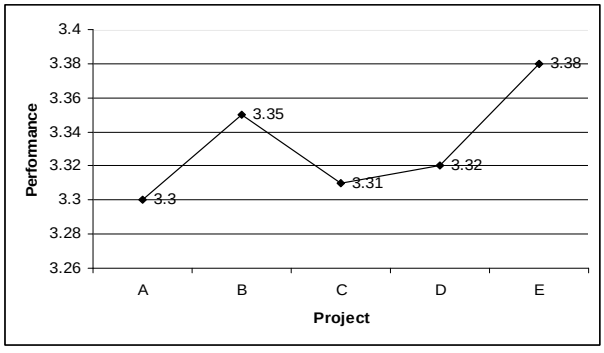


Fig. 10: Project Performance

Project performance also can be viewed by analyzing the contributions of each variable (Fig. 11). The lowest performance contributed by the software which is between 2.77 to 3.46. People and skill is given in a variety score of contributions that are between 3.19 and 3.25. The contribution of the hardware and network and communication is equal to all projects.

The contributions of the local variables are given equally for each project on the hardware and network (and communication). The procedure also contributes equally for all the projects involved. However, software and people (and skill) contribute differently to each project (Fig. 11).

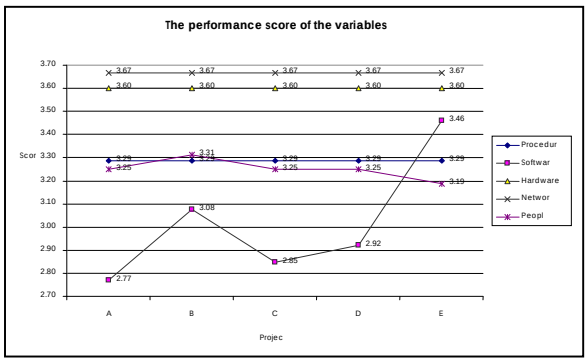


Fig. 11:Project Performance Score by Variable Contribution

The ITKPI model and evaluation process are considered as a new approach on evaluating the project achievement for Case X. Besides that the proposed performance variables may provides a new view of measurement for the organization on evaluating the project achievement. The proposed ITKPI gives an additional alternative for indicating the project performance. The perspectives of the ITKPI also were able to identify the limitation of the IT infrastructure and can be used as the measurement for future improvement. This may offer preference for the case to put into practice in the future.

5.0 Conclusion

Study discovers that Case X previously has the structure of KPI and performance measures. The existing performance measures basically have included measurement related to human factor, skill, network and communication, application/software, and hardware. However, the existing measurement was employ in different perspective compare to the proposed ITKPI model.

Implementing the performance evaluation process to Case X has been given a new perspective in measuring the achievement of the ITSP projects. The previous approach of measuring project performance was based on the time, schedule and costs. The process of measuring performance is conducted using step by step approach and finally comes

to the performance evaluation of the projects involved. However, the result obtained is required to be verified by the case study to justify its applicability and measurability. Therefore, the study has made an effort to obtain some feedback from the Case X on the performance evaluation results. The study also attempts to test at other case study with different organizational setting in the future.

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