From Habitual Problems to a Systematic Approach for Problem Solving

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Abstract

The current presentation- the systematic approach for problem solving. Starting from identifying the habitual problems in an organization, this leads to the awareness to the areas of concern. Then, performance measure is assigned to monitor the habitual problems. It aims to be a tool to highlight when there is a sign or an occurrence of the problem. In other words, this is an approach to call for an attention when the problem occurs. The system also combines some supporting functions to accomplish the problem solving (e.g. functionalities of process map, problem solving guideline, tools and techniques, relevant project records). Those functions intend to be combined and proposed as the systematic approach for problem solving. In addition, the system requires to run as real-time since it aims to provide an auto-monitoring system and the indicator for problem occurrence. However, the process of problem solving still requires human-interact. Nevertheless, even the system can combine all supporting and relevant functions in problem solving, but human is still necessary to generate the solutions and decision making.

1. Introduction

The design of this research is based on an approach to highlight the relationship between the problems that regularly occur in an organization and the performance measure. While habitual problems are seen as problem symptoms, performance measures are used to monitor these symptoms. Performance measures will alert the symptom of decline when the problems need to be concerned. However, only two issues as mentioned can sorely highlight the occurrence of the problem. In other words, rather than stopping by highlighting the problem occurrence, the system designed should guide user to finally complete the problem solving. This leads to the attempt to design the systematic approach for problem solving. Therefore, the system needs to combine other functions that facilitate the problem investigation and generate the solution.

2. Initial System Designed

Initially, the design of this system was based on two key issues; habitual problem and performance measurement. Before moving to the design of the system, it would be better to ascertain these two issues

2.1 Habitual Problem

In the system designed, this module summarises vital problems that the department faces on a regular basis. The objective is to pinpoint the areas that should be considered and likely be set as future improvement projects. In cases where the problems have not caused serious losses, these proposed habitual problems only highlight the critical areas that should be monitored. If the problems cause serious losses or get worse outputs, the particular problems are immediately proposed as improvement projects and be solved by the problem solving methodology.

2.2 Performance Measures

Problem solving is based on facts, figures, and data. The effective problem solving requires data to be available on all key process and variables. In other words, all key processes require the appropriate indicators to measure and evaluate the data periodically [1]. Accordingly, performance measurement is also one of the starting points for identifying the opportunities for process improvement. Process improvement needs to measure the existing performance of processes in order to understand the current performances and then identify the improvement. Particularly, displaying performance measures is one of the critical methods to provide the communication of the process situation and highlight problems. Therefore, the system designed considers performance measurement as the

main vehicle to point out any weaknesses or failures in the process. When there is a significant gap between the current performance of the process and the standard or desired performance, this alerts awareness of the need for improvement to the key performance areas. Consequently, these failures will be set as the improvement projects.

However, data collection is time and cost consuming. As been stated, if done right, it is a wise investment but if done wrong, it is wasteful [2]. Thus, an organisation needs to consider and properly design the data collection plan and performance measurement. There are three main methods to identify and set performance measures in an organization. Figure 1 illustrates the model of the interaction among three methods to set the performance measures. These methods are summarized [3-5];

- Method 1: Once the organizational strategies, strategic goals and critical success factors are defined, performance measures can be identified due to the relevance to these elements.
- Method 2: An organization firstly identifies the key business activities. Subsequently, performance measures are identified due to the relevance to those key activities and the consideration to support business strategy.
- Method 3: People, who are familiar with the business processes, identify the key performances or process variables that should be controlled. In other words, performance measures are identified from a worker's knowledge and experience. To this method, the habitual problems might be useful sources to highlight the areas of concern.

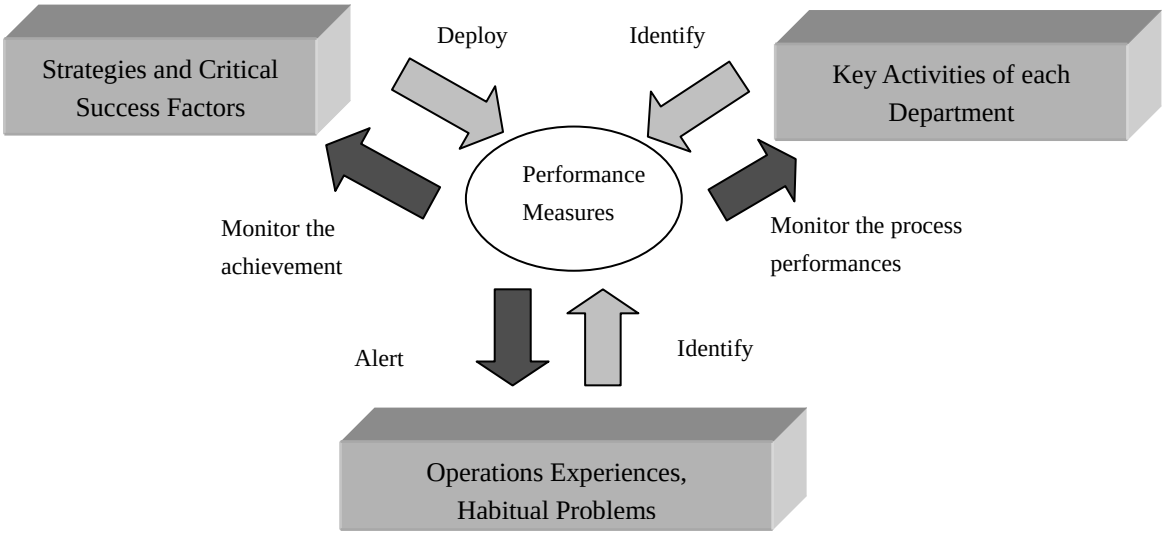


Fig. 1 Performance measure selection

2.3 The Connections between Habitual Problems and Performance Measures

As mentioned, three methods for identifying performance measure are typically employed. Within this system designed, the problem solving is considered as main function. Subsequently, the focus is specifically scoped to the connections between habitual problems and performance measures. Thus, figure 2 represents this connection.

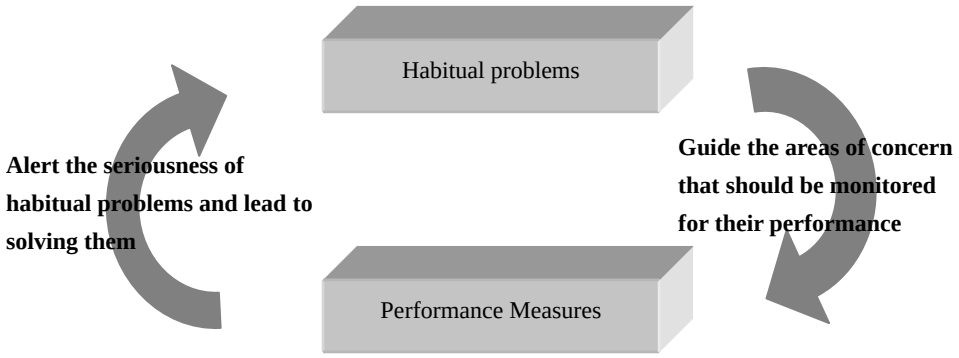


Fig. 2 Connections between habitual problems and performance measures

The author has been convinced that these problems can provide effective relationships to the performance measures. While habitual problems are seen as problem symptoms, performance measures are used to monitor these symptoms. Performance measures will alert the symptom of decline when the problems need to be corrected. Simply, while habitual problems are useful to pinpoint the areas of concern or opportunities for future improvement, these areas should be monitored for their performance. The performance measurement will highlight the high occurrences of habitual problems and lead an effort to fix them immediately.

Indeed, the underlying reason is to ensure that key problems are being addressed and monitored. Thus, in the system, each habitual problem identifies the relevant performance measures that are helpful in alerting the occurrences.

3. The Extension of the System Designed

Considering the further extend, it would be more beneficial to combine some supporting functions to enable user completing the problem solving entirely. In other words, rather than stopping by highlighting the problem occurrence, the system designed should guide user to complete the problem solving. Thus, some functions are identified. For example the process map, which indicates where the performance measure collects the data from; in fact, the map can highlight more specific processes that have the problem. Combining the guideline of problem solving can enable the user, who sees the problem, to solve problem entirely. This module also provides the tools and techniques that are primarily employed to solve the problems. The tools and techniques are suggested to the problem solving method. Lastly, after the problem is solved, the methodologies to solve that problem, lessons learned, experiences, obstacles and so on should be gathered. This leads to the introduction of the project library. This module enables the user to share and reuse knowledge. Figure 3 and 4 represent the conceptual design of this system. Whereas figure 3 represents as the normal situation, figure 4 represents when the problem occurs.

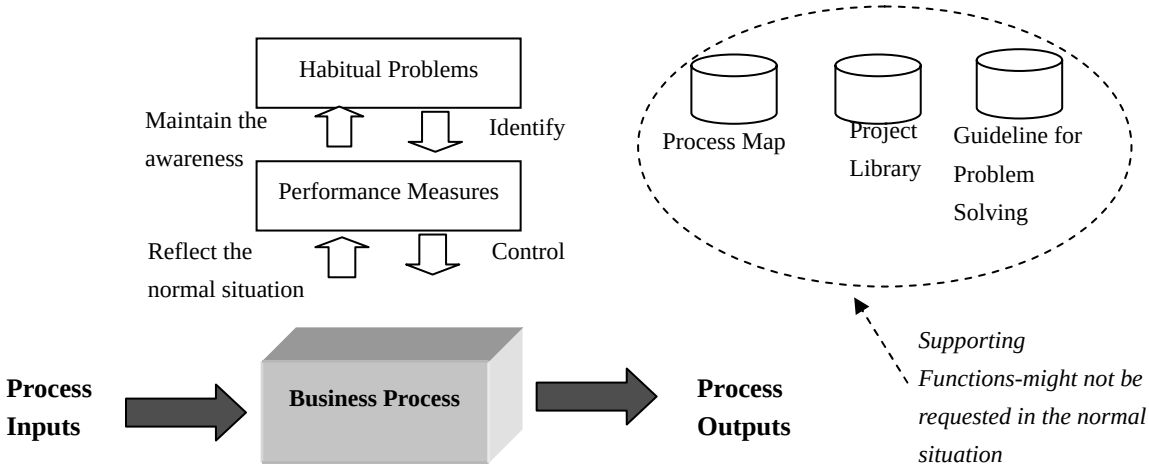


Fig.3 Conceptual design of the system- at the normal situation

At the normal situation, the system only considers the process operations by monitoring the performance data. Without any unusual situations, other supporting functions (e.g. process map, project library and guideline for problem solving) might only be displayed as the icons or just banners for links- in case, anyone want to deep in detail. However, if the performance data indicates some unusual situations, this is a sign calling for an attention. All the relevant data and information and also some system functionalities are pulled to contribute as supports for problem solving. For example, the process map displays the business process of the problem; the relevant projects are shown up for further review; performance data and its historical data are ready for investigation and so on. In short, all the functions are contributed to provoke the problem solving. However, the system could be claimed as only the supporting system for deciding the process improvement and enabling the problem solving. It is unable to completely end-up with the solution of the particular problem. The system still requires human interact and decision making. Subsequently, it is necessary to understand each module within the system designed.

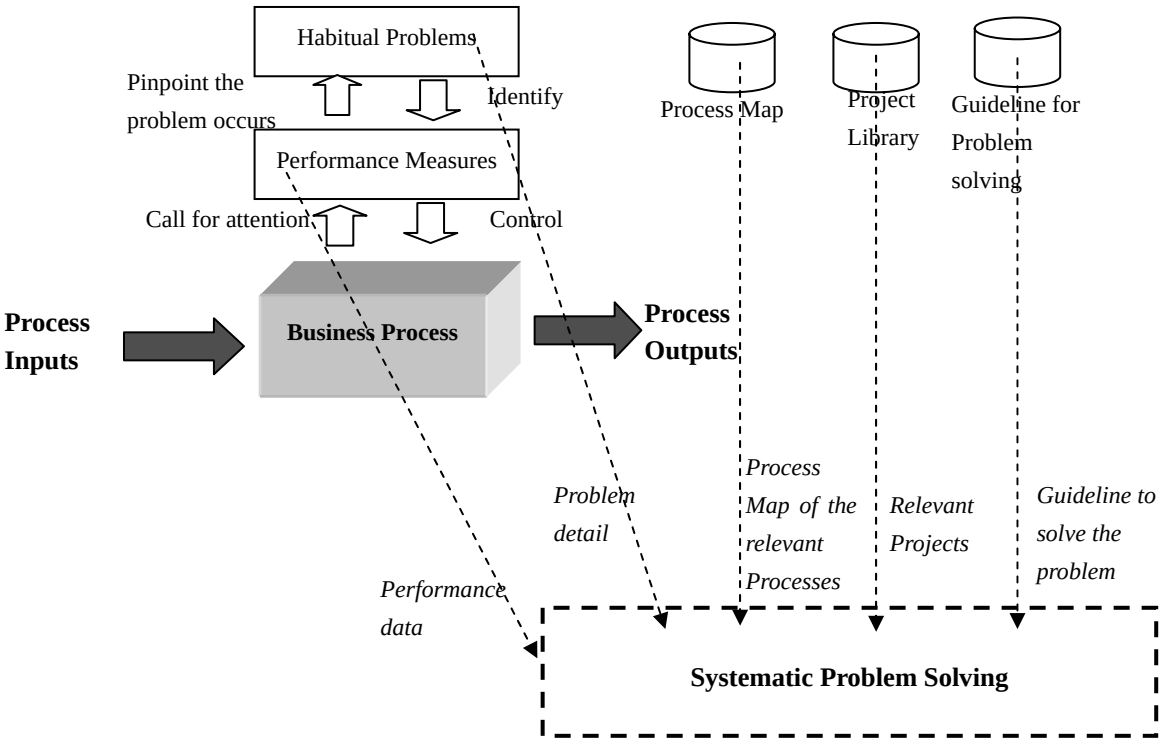
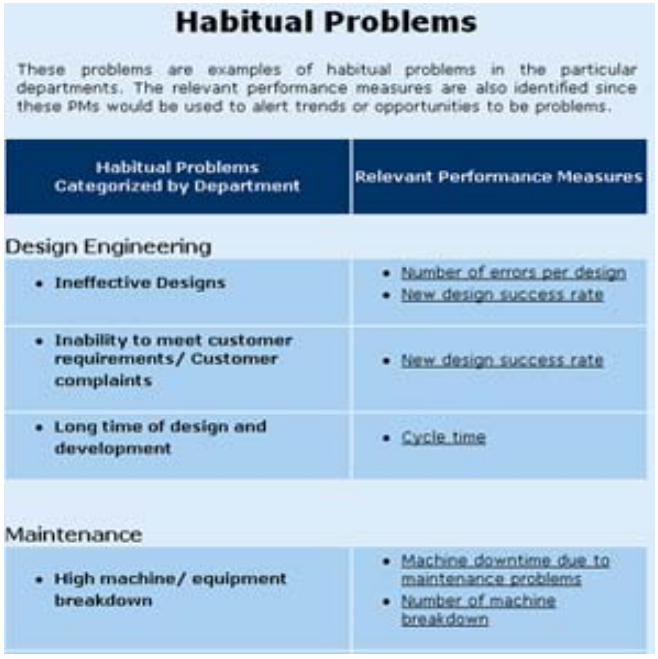


Fig.4 Conceptual design of the system- when problem occurs

4. System Components

4.1 Habitual Problem in the system designed

The concept of this module was mentioned at the beginning. It could be claimed that the identified areas and habitual problems also represent what types of improvement are important to the organisation. These aspects communicate what the organisation's objectives are and the kinds of projects on which an organisation wants to focus. Within this research, the focus is on improving the operations or business process and some key issues are identified. For example, to improve the customer satisfaction, to reduce waste, downtime and resource consumption. These examples cannot cover every aspect but there is an attempt to guide the ideas and, in turn, to initiate improvement projects. Figure 5 represents main access to the section of habitual problem within the system designed.



Habitual Problems

These problems are examples of habitual problems in the particular departments. The relevant performance measures are also identified since these PMs would be used to alert trends or opportunities to be problems.

Habitual Problems Categorized by Department	Relevant Performance Measures
Design Engineering	
• Ineffective Designs	• Number of errors per design • New design success rate
• Inability to meet customer requirements/ Customer complaints	• New design success rate
• Long time of design and development	• Cycle time
Maintenance	
• High machine/ equipment breakdown	• Machine downtime due to maintenance problems • Number of machine breakdown

Fig.5 Main access to the section of habitual problem in the system designed

Habitual problems are categorized by the department and each habitual problem (left column) is identified its relevant performance measures (right column). Within the system, the user can click for link systematically.

4.2 Performance Measurement

The performance measures are selected based on the methods mentioned in section 2.2. Each identified habitual problem needs at least one performance measure. The user can access from the section of habitual problem. Else, at the main access to this section, performance measures are classified by the department. As in figure 6, it is the main access to performance measurement section. By linking to each performance measure, the detail in terms of its purposes, methods and applications is provided. As well, the process map indicating where to collect the performance data and the software for real-time data collection is provided. Figure 7 represents an example of performance measurement display when linking to a particular one

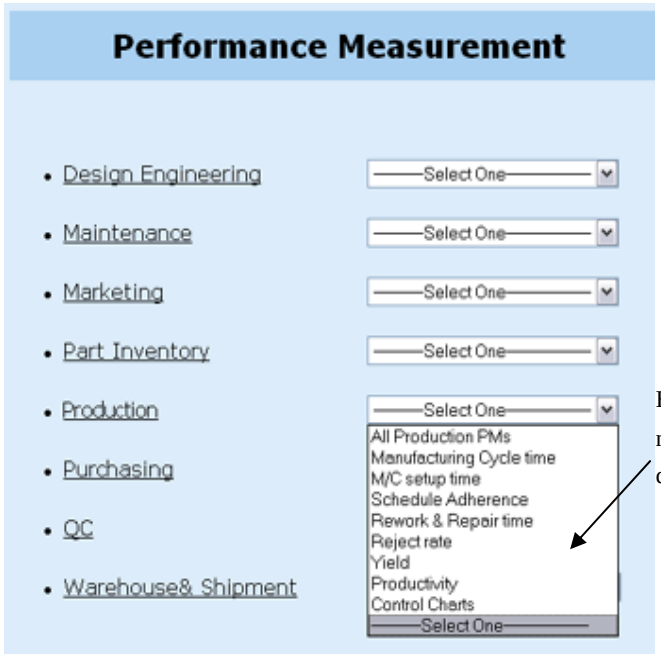


Fig.6 Main access to the section of performance measurement in the system designed

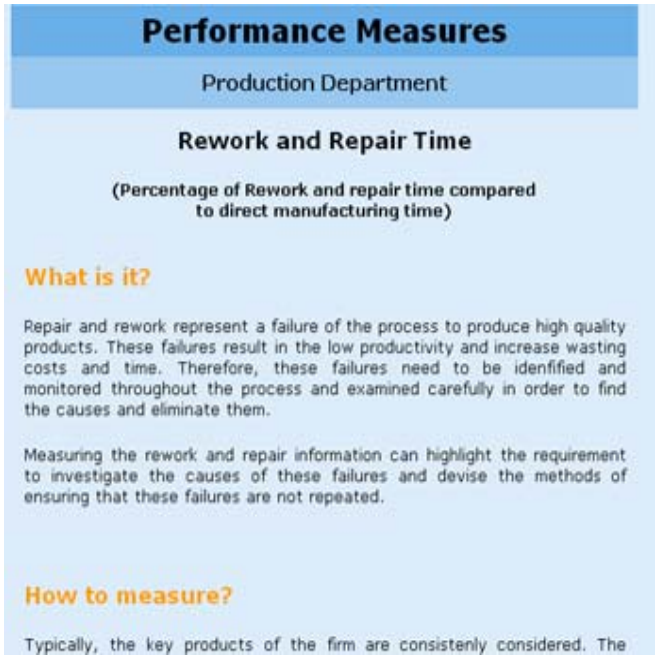


Fig.7 An example of performance measure displaying in the system designed

4.3 Supporting Programmes for Performance Measures

This is the supporting module for performance measures (PMs). The programs were developed as advanced functions by the dynamic web languages. The program aims to promote the uses of performance measurement and to enable the real-time collection and presentation of performance data. Indeed, it is a method to examine the variations over time. This is the best way to share performance data among co-workers or even people outside the particular process and managers. The performance data can be shared much more readily through the internet.

Each PM programme also provides the instructions in terms of the period of time to collect PM data, the calculation or measurement system, and how to record/ change/ delete the PM data in the program. After the user records PM data, the data are presented as a chart. This provides ease of review and presents any trends, and also promotes comparison of data. Figure 8 represents an example of program to support the performance measure in the system designed and figure 9 provides an example of performance data presentation.

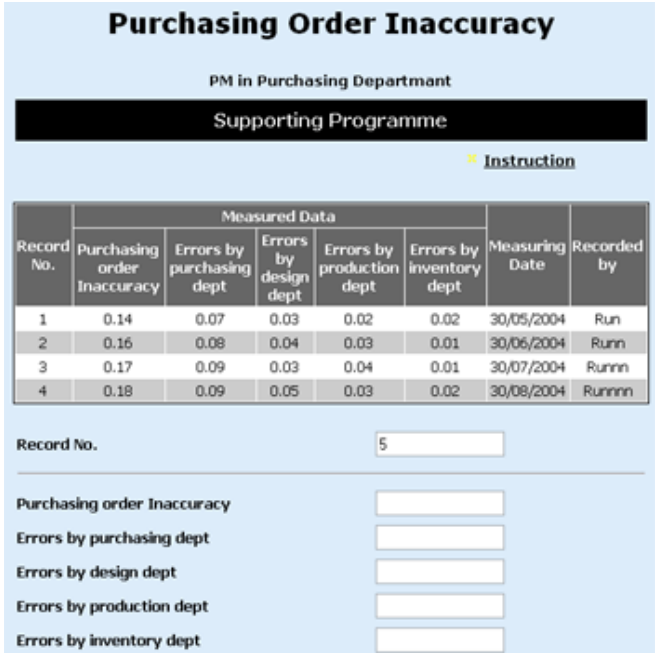


Fig.8 An example of program to support performance measure

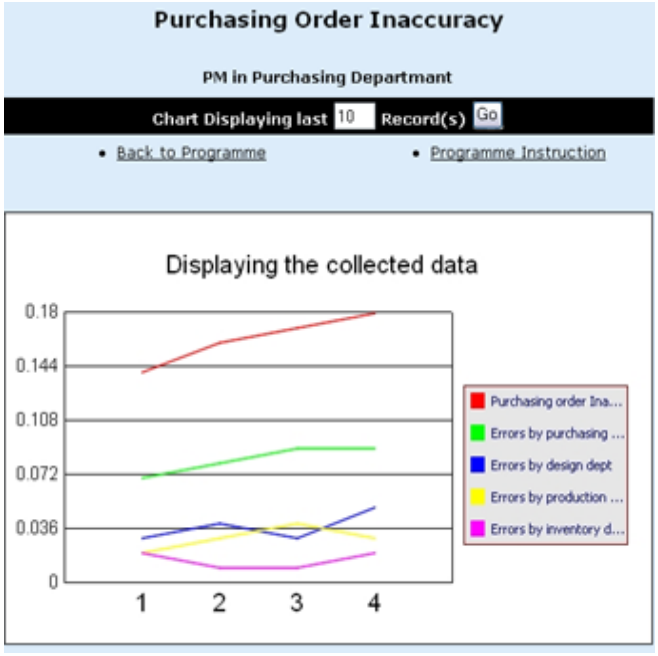


Fig.9 An example of performance data presentation

4.4 Process Map

A process map is a representation tool, which is composed of process, flow, event and external object [6]. In other words, it is one of the standard tools for describing the business process. It provides a pictorial view of how work gets done. In some situations, a picture is worth a thousand words. The lines and symbols on a process map are used to explain what is happening, where it is happening, when it is happening, who is doing it and how inputs and outputs are handled and distributed**.** In this system, the process map also indicates the performance measures within that particular process. This aims to indicate where the performance measures collect the data from**.** Additionally, within this map, there are link to performance measurement detail and link to PM programme when you click on each particular performance measure. Figure10 represent an example of the process map. On the top of map, there are performance measures within the process activities and those also indicate where the measures can get the data from.

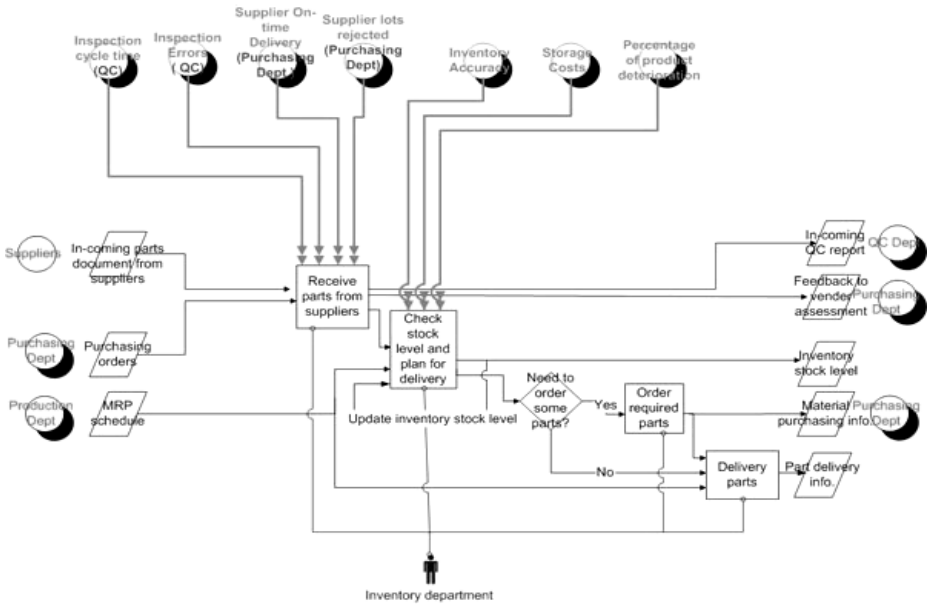


Fig.10 An example of a process map

4.5 Project Library

This function contains all project records that have been done within an organization. The attempt is to approach knowledge management system (KMS), which conduct After-Action Reviews (AARs) or lessons learned sessions. In other words, it attempts to codify the best practices and most useful knowledge, then it fosters reuse and sharing of knowledge. It enhances the application to similar projects by learning and applying the proven approaches, best practices or experiences for leveraging the new projects. It enables users to discover what happened, why it happened, and how to sustain strengths and improve on weakness. In other words, accessing the historical records can provide certain insights and shorten the time taken to complete other similar projects. The objectives are to develop the best practice and reduce the likelihood of making the same mistakes.

The functionality of this module is to create knowledge repositories for the project records. The records should be uploaded to the system database after each project has been completed. The records are kept, indexed and managed centrally on the system database.

The project record provides benefits in terms of sharing the success and failures learning lessons, challenge and knowledge. Figure 11 presents the main page of the project library module, which enables the user to drill down to three functions: (1) Folder of standard document, (2) Function for uploading the project record, and (3) Search engine for project record. Figure 12 and 13 show the pages for uploading and searching the project record.

Fig.11 Main page of the project library module

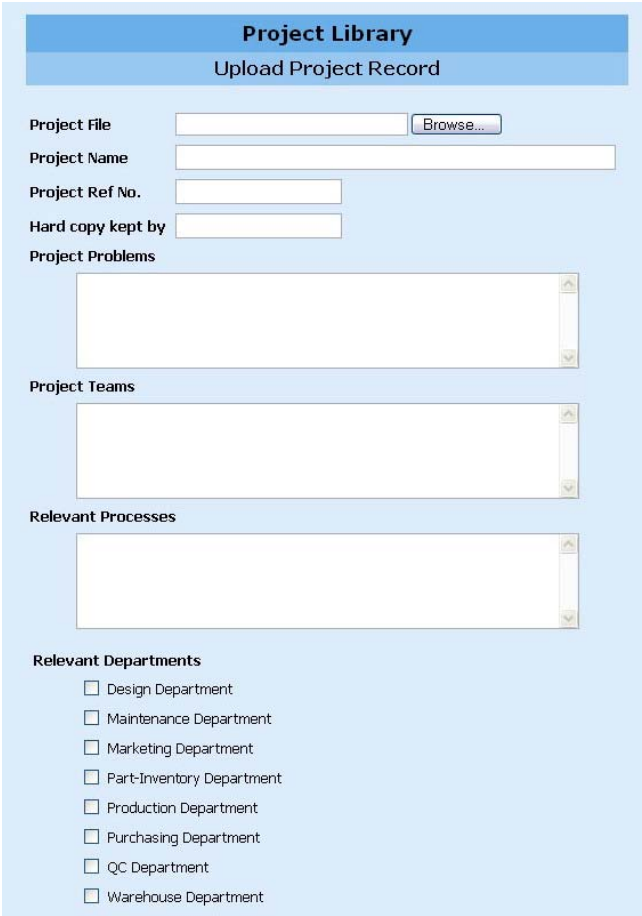


Fig.12 Function of uploading the project record

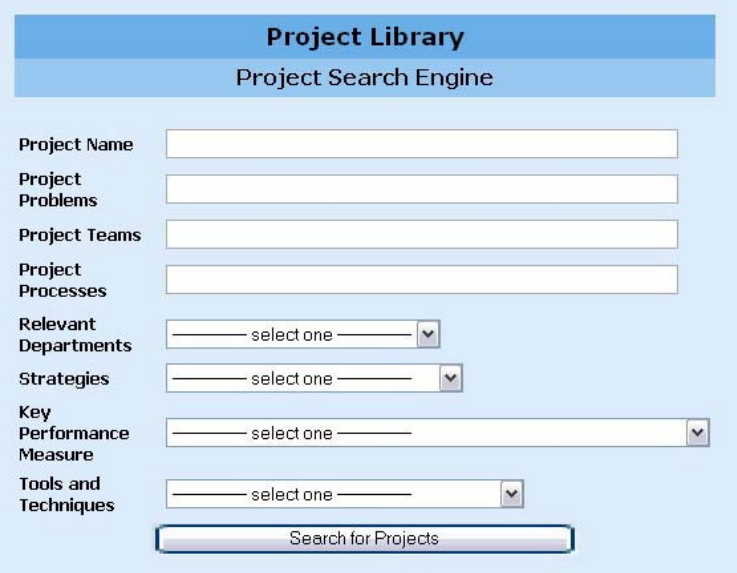


Fig. 13 Function of searching the project record

4.6 Problem Solving Guideline

The last component but the most important one, the problem solving guideline is a tool box of guidelines and techniques to launch the problem solving methodology in an organisation. It attempts to provide the easy access and understandable initiatives, tools and steps in driving problem solving methods. There are a number of problem solving methods depending on the organizational interest. For example, PDCA (Plan-Do-Check-Act), this is the most popular one. Within this system, Six Sigma methodology; DMAIC (Define-Measure-Analyze-Improve-Control) is introduced. The detail of stages in DMAIC is proposed in the forms of web-detail and also the form of PowerPoint file.

Additionally, there is the pool of tools and techniques that might be used within the problem solving method. Each tool and technique provides a brief explanation of its objectives, step-by-step instruction on its use, and a short example. In short, this part could enable people who are inexperienced with the particular tool or technique to complete it efficiently. Figure 14 represents the main page of tools and techniques within the system designed.

Fig.14 Main page of tools and techniques

5. Conclusion

As presented, the design of this system is based on the basis of considering the general problems that people normally face. Starting from identifying the habitual problems in an organization, this leads to the awareness to the areas of concern. Then, performance measure is assigned to monitor the habitual problems. Considering the further extend, it would be more beneficial to combine some supporting functions to enable user completing the problem solving entirely. In other words, rather than stopping by highlighting the problem occurrence, the system designed should guide user to finally complete the problem solving. Thus, some functions are identified. The process map, which indicates where the performance measure collects the data from; in fact, the map can highlight more specific processes that have the problem. Combining the guideline of problem solving can enable the user, who sees the problem, to solve problem entirely. This module also provides the tools and techniques that are primarily employed to solve the problems. The tools and techniques are suggested to the problem solving method. Lastly, after the problem is solved, the methodologies to solve that problem, lessons learned, experiences, obstacles and so on should be gathered. This module, which is known as the project library, enables the user to share and reuse knowledge. In short, this is a system required to run as real-time network. The attempt is to provide an auto-monitoring system and the indicator for problem occurrence. However, the process of problem solving still requires human-interact. So far, the system can combine all supporting and relevant functions in problem solving, but human is still necessary to generate the solutions and decision making. In addition, this is the pilot system. The system needs to be customized when fully implemented.

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