RISK MANAGEMENT IN SOFTWARE PURCHASING: AN EMPIRICAL STUDY OF THAI COMPANIES

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ABSTRACT

When business competition is increased, it is possible that legacy software could not serve the response on business requirements. Software purchasing is the solution that could help organizations to take action on dynamically requirements. Some organizations have been successfully implemented newly software while some fail according to the differences between risk management processes that selected from each organization. Therefore, a survey of risk management processes in various business organizations in Thailand had been performed and proposed the most accurately risk management factors that could reduce percentage of failure comparing with organizations' satisfaction rate. Additionally, the experimental results have shown that applying standard risk management process is not meet user satisfaction while some risk management processes of Thai's organizations performed better results rather than standard.

Index Terms— user satisfaction, risk management process, satisfaction rate, standard software purchasing

1. INTRODUCTION

There is no standard for purchasing software process. Many organizations define their own processes to filter software that meet their requirements. According to this, a number of organizations fail to achieve their new software. Sometimes the purchased software could not proper meet their requirements, some features cannot be used, incompatible with their system or culture, and not meet user satisfaction [1][2][3]. Thus, various risk management process have been proposed to protect and prevent the failure in software purchasing.

There are several risk management processes to apply for software selection, such as proof of concept [4][5], requirement analysis [6], software presentation, product prototype analysis [7][8][9], software demonstration, and learning from other organizations. However, the combination of these methods could reduce risk. Numerous studies have shown that over half of software development projects fail; the significant reason that causes the failure is breakdown in the "requirements elicitation" process. Additionally, problems occurred during software implementation are such as vendor services, maintenance costs, features and functions do not meet the demand, incompatible with system, fail user satisfaction and software liabilities, etc.

Referring to the requirement elicitation process, this process produces requirements of users that lead to the software purchasing. Therefore, the details obtained from this process are very significantly important. Since there are various tools to be applied in this elicitation process, such as use cases, and data flow diagrams, etc., these tools must be implemented properly by the software developer team, especially software analysts. Unfortunately, the final results that are the delivered software or purchased software, mostly, do not completely meet the needs of the entire organization.

Although there is failure in software purchasing in some organizations, applying risk management helps reducing this failure in other organizations as well. Therefore, this paper focuses in user satisfaction result of Thai companies on each risk management. The expected outcome from this paper is to present the currently procedures in software purchasing that every organization used.

This paper is organized as follows. Section 2 introduces the standard risk management process. Section 3 represents organization surveys method; data analysis and the results in Section 4. Discussion about standard risk management against Thai's risk management procedure has been described in Section 5. Finally, conclusions are drawn in Section 6.

2. STANDARD RISK MANAGEMENT PROCESS ON SOFTWARE PURCHASING

Standard risk management process [10] on software purchasing which widely use in every IT-based is based on the requirement analysis process. Due to the requirement analysis process is the process for understanding users' needs and expectations from a proposed system or application. Additionally, this process is the most important

stage that must be well-defined in the Software Development Life Cycle model otherwise its failures will affect to all other following processes that cause the software failure to the entire organization thus overall process was adopted to fit in standard risk management process.

Requirements [6] are a description of how a system should behave or a description of system properties or attributes. It can alternatively be a statement of 'what' an application is expected to do.

Software Requirements Analysis Process covers the complex task of eliciting and documenting the requirements of all users, modeling and analyzing requirements and documenting as a basis for system design.

Proof of concept (POC) [4][5] requires an agreement set of proofs or tests that define its success criteria. Proof requirements are generally agreed and documented after the vision scope document is completed and before defined solution. This document defines the proof context and identifies individual components of proof requirements. Each proof includes a requirement, proof method, acceptance criteria, and success measures.

Proof requirements relate to the objectives and goals established in the vision scope document. In very short POC's, this document may be combined with the vision scope document.

- Proof Requirements: The proof requirements are used to drive the POC solution design and to manage project scope during subsequent phases of the POC. It is used as both a reference and a driver for the proof presentation and documentation and can also be used to record results against each required proof.
- Objectives and Scope: The POC objectives, scope, and overall solution vision are defined in the vision scope document. The proof requirements document defines how the solution vision will be confirmed by the POC. The proof requirements define at a specific level how this will be achieved.

Previous studied conclude that, the POC process normally occurs after software is selected. It is a major undertaking and should not be used as a tool to compare one solution over another. Furthermore, as the POC is orientated to the chosen solution and implementation methodology, the content or process undertaken cannot be readily transferred to another software solution. Using only POC could be used to confirm the preferred vendor's status rather than establishing it.

There are a number of advantages to the POC for the organization including:

Organization could meet expected synchronization with the vendor. In addition, organization could extract and identify software functional gaps or overselling. In each evaluation phase, evaluated members have to test and track software based on organization's requirement.

POC improved accuracy scoping which provided a better understanding of the organization requirement to complete the implementation. POC process allows the organization to evaluate the software and implementation vender.

However there are limitations of the POC which should be noted as follows.

Depending on the commercial agreements, the POC can be placed within the sales cycle thus software's vendor is restricted for fully disclosure. Further, the documentation produced within the POC may have marketing content which does not add value to the project.

A POC should be completed as part of the selection process when the risk of project failure is comparatively high. Risk can be measured by two key variables: complexity of requirements, and level of expertise within the selection team members.

Product prototype analysis [7][8][9] involves the production of functionally useful and trustworthy systems through experimentation with evolving systems. Generally, the experimentation is conducted with many users' involvement in the evaluation of the prototype.

Software demonstration displays software behavior, features and functions. This process can identify software weak points. This process could help organization in decision which software should proper for organization. It shows software feasibility and user friendly.

Software presentation shows software advantages strong points, feasibility, and functionality. It also presents software interface, software language support and minimum requirement of the system.

Risk management process on learning software behavior from other organizations researched for other organizations that used the purchasing software. In term of service, functionality, compatibility, usability and flexibility, that how many trouble during implementation and production.

Although, the standard risk management procedures have ability to eliminate risk on purchasing the worthless software, unfortunately each procedure also has disadvantage features. Therefore, applying the standard procedure does not guarantee that the delivered software will be completed as needed. Thus, in order to avoid the software failure, all business organizations have to determine their own standard risk management process that ensures their needs to be served. Therefore, this research will focus on the risk management process that the business organizations have really applied to support their satisfactions in software purchasing.

3. ORGANIZATIONAL SURVEY METHOD

In the business section, software failures can cause dramatically damage to the entire organization. Therefore, selecting software to be implemented is an important issue that every manager cannot ignore. Additionally, most business organizations have different business profiles and objectives. Thus, the software purchasing process for each

organization is usually different from each other. So, this research, the study of software purchasing has been performed using depth interviewing, including distributing the questionnaires to various organizations with different sizes and different business objectives.

The interviewing surveys method is performed by walk in to organization and send questionnaire directly to the organizations. Sampling data was collected form IT-related-based business on both computer-based and application-based organizations, including all business classifications, such as hospitals, airlines, communications, information technologies, financial and banking, and etc.

The interviewing process has performed in 8 companies. These companies can be classified as financial, software consult and support, software house, and car rental companies. Moreover, the sizes of these companies can be categorized in 3 large companies, 2 medium companies and 3 small companies. Focusing on the quality of result, we have to interview management level person who have to make a decision on purchasing and have best knowledge on the whole project. Thus, every interviewee is in the rank of manager or president of the company who authorizes in software purchasing process of the organization; the interviewing time of each place is about 1 hour.

The business size can be classified into 3 groups includes large, medium and small defined by Thai's ministry of industry. Organizations which have investment budget less than 5 million baht are defined to small. Organizations which have investment budget during 5-200 million baht can be defined to medium. Organizations which have investment budget greater than 200 million baht represent to large.

In order to obtain the real risk management criteria in the business area for software purchasing, another elicitation method to capture decision factors of business organization is the use of questionnaire. Questionnaires are distributed to 110 companies; these can be classified as 22 large, 71 medium, and 15 small sizes as same as the companies in the interviewing process.

4. SURVEY RESULTS

Thai's organization software purchasing process was collected from interviewed and questionnaire normally includes below software selection process which are:

- Read advertisement on computer magazines, open vendor auction, or searched the internet on software ranking website.
- Announce organization requirement and let software's vendor to give and auction.
- Provided organization system overviewed to selected vendors. Organizations can analyze possibility to implement their software.
- Set up software purchasing project team members. Team members include system analysts, developers, business analysts, and users.
- Invited selected vendors to present their software features, implemented processes and plan.
- Applied organization's risk management process for decision making on software purchasing.

Thai's organization typically used at least two of software selection processes above to obtain the purchased software.

The results from the elicitation process show that there are different risk management processes among different sizes of organizations, with irrelevant to the business profiles.

There are mainly two influence types that major concerned: business influencers, and technical influencers. It is obvious that the business size effects on the software purchasing process. By the business size, small business organizations usually avoid using complicated risk management process in case of reducing time and tasks, while the larger business size concentrates in complicated risk management processes because it could produces better result than ease tasks.

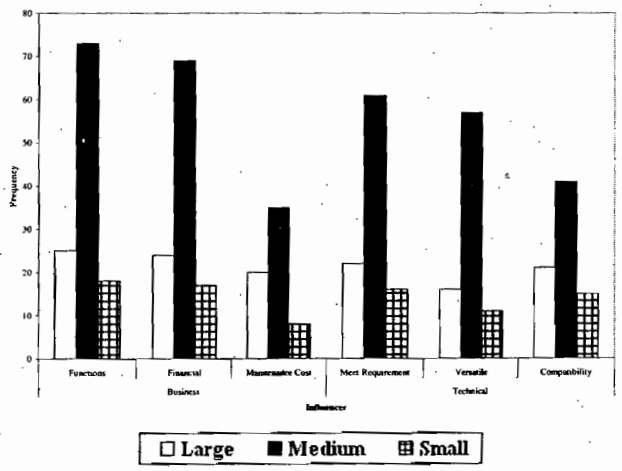

Figure 1: Consideration Factors for Software Purchasing of Each Company's Size

According to Figure 1, it is obvious that every organization concerns in financial, functions, the maintenance cost, requirement satisfactions, versatilities, and compatibilities. However, the large organizations, mostly, concern in financial, functions, meet requirements, and compatibilities more than any other influences. Medium organizations concern only in financial, functions, and requirements accomplishment. Small organizations are different from other sizes because it most concerns factor are financial, functions, and compatibility.

As the consequence of the result mentioned in the previous section, the most important factor that every

companies must determine before the risk management starts are financial, functions, maintenance, compatibilities, and requirements fulfillment.

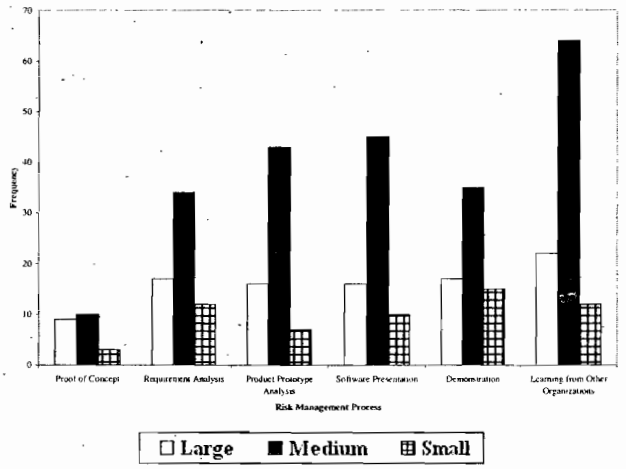

Figure 2: Risk Management Process for Software Purchasing

Figure 2 shows that the risk management process, which is widely used from Thai's companies, is learning from other organizations because it is the easiest way to obtain software behavior and vendor services without taking much effort. While POC represents the lowest used from the surveys. The standard risk management procedure which is requirement analysis is medium used on every business size.

$$\text{The User Satisfaction Percentage} = \frac{\sum_{i=1}^{5}(N_i * i)}{M * 5} * 100$$

N = Total Number of Organization that presents in each satisfaction level.

i = Satisfaction Level value = 1,2,3,4 and 5 greater means much satisfy.

M = Total Number of Organization uses each risk management process.

Figure 3 shows the user appreciates rate of computer-based organization using every focusing risk management method. POC demonstrates the highest user acceptance even though it is not widely used in many organizations because it has to perform more complicated tasks and take a lot of resources to be done. Software presentation shows the lowest user acceptance. Requirement analysis shows moderate user satisfaction rate. From Figure 3, there are similarity between POC, requirement analysis and product prototype analysis in some factors which means there is no difference on user expectations between selected procedures on these factors. It can be concluded that POC, product analysis, requirement analysis, learning from other organization, software demonstration and software presentation are results on user appreciate rate from high to low respectively.

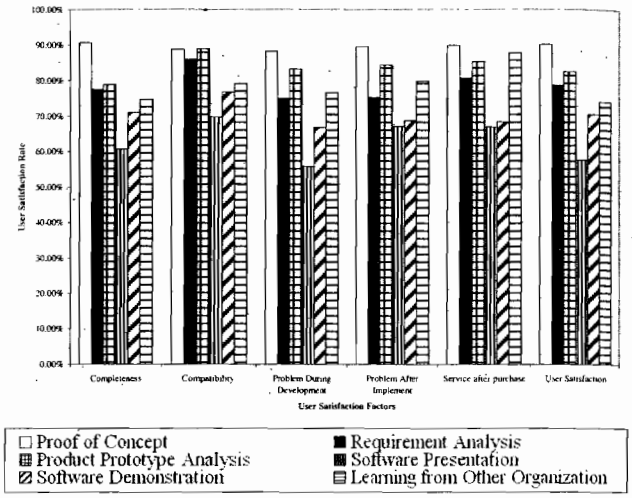

Figure 3: User Satisfaction Rate on Risk Management Process with Computer-Based Organization

Figure 4 presents user acceptance rate of application-based organization using selected risk management procedures. The results shown in Figure 4 is consistent with the results presented in Figure 3. This means that the consequences of user perceptions on risk management processes are going in the same way like computer-based organizations. POC still presents higher user satisfaction rate than standard process.

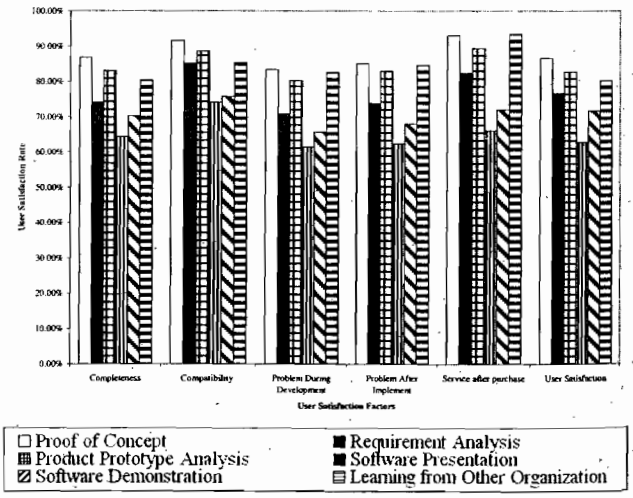

Figure 4: User Satisfaction Rate on Risk Management Process with Application-Based Organization.

According to Figure 3 and Figure 4, it can conclude that POC provides the better user perception than the standard process.

Since the trend of the user satisfaction rate of the risk management process on the computer-based organization and application-based organization is going on the same way. Although, application-based organization presents user

satisfied rate lower than computer-based organization. However, the user satisfaction rate on the risk management process that applied to purchase software between both organizations is still going on the same way. So, the rest will not be mentioned on the differences between computer-based and application-based organizations.

Some organizations are using more than one risk management process to increase percentage of user satisfaction by combining between the risk management processes. The percentage of user perceptions on combining between POC and other 2 management methods which are learning form other organization and product prototype analysis will display on Figure 5.

Figure 5 shows that combinations between risk management processes significantly increase user acceptance rate. Additionally, it shows that the combinations present better user satisfactions than the standard software purchasing procedure. The user perception rates between these two methods are significantly different.

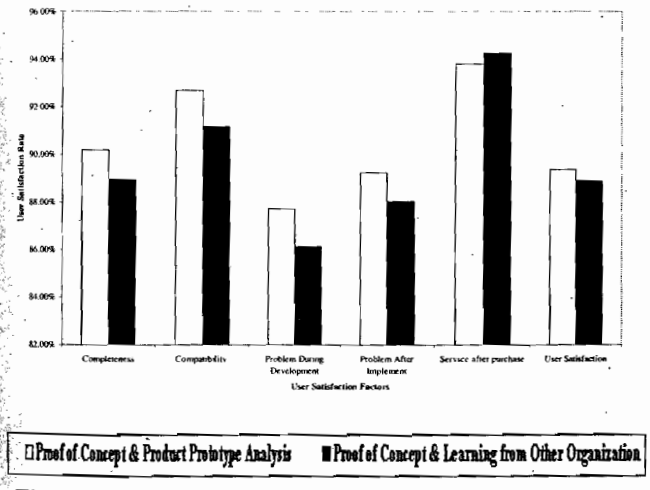

Figure 5: User Satisfaction Rate on the combination of risk management processes.

As a result from Figure 5, the combination of POC and product prototype analysis shows highest user satisfactions comparing with the combinations among POC and other risk management procedures.

5. DISCUSSION

The advantages of requirement analysis are

- Requirement analysis could extract organizational demand precisely.
- There are various tools that support for helping organization extract requirement such as use case, and data flow diagrams.
- The overall process has ability to handle dynamically requirement.

The weakest points of standard procedure are

- Extracting user requirement by using tool with inexperience officers could produce greatly error.
- Since there are various tools for extracted user requirement expertise should select the appropriate tools that suite for organization culture and process.
- Requirement analysis is focusing only on the requirement of organization. There is no process to analyze purchased software that can use correctly.

POC can track purchasing software information by defining succession criteria and test software features and functions based on assumption criteria. This process could help organization on filtering malfunction software. By the way, this method could not handle flexibility or dynamically requirements and take too much processing time.

Product prototype analysis could understand software nature, feature and function, interface, user friendly, and compatibility. This procedure could not handle on user requirements in detail.

As a result shows above, the trend of the user appreciation rate was significantly increasing using combination of risk management processes. Each process can be used concurrently during software selection process and promoted each other to increasingly acceptance level while standard risk management presents moderately user perception rate. This method performs better result than other risk management methods, excluding the POC and product prototype analysis.

6. CONCLUSION

Currently, Thai's companies are relied on software to manage their business. Most software come from purchasing procedures. Unfortunately, the standard risk management method on software purchasing can not served users' requirements. Thus, the software purchasing process becomes critical issues because its results affect the entire operations of the organizations. Therefore, Thai's organizations have to find the better procedures to be applied on the software purchasing process.

There are several risk management procedures could be applied for handle software purchasing, including POC, product prototype analysis, software presentation, software demonstration, and learning from other organizations. As the results, the standard risk management procedure shows the moderate user satisfaction and presents the user perception is lower than the POC, product prototype analysis, and both combinations. The previous results analyze that using only one risk management process could help organization to selected software but it still be not capable. In order to obtain accuracy on software purchasing process, organizations should use various risk management process to select the appropriate software.

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