

Current Practices in Monitoring Software Development Process in Malaysia

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Abstract - The aspect of monitoring is one of the important factors to determine the success of software development. Failure to produce the good quality software, being late to produce, over budget and fail to meet the needs of users are considered as software crisis. A survey pertaining to the practice of monitoring the software development process in Malaysia had carried out. Structured questionnaires were used to collect data. The data analysis was carried out by using basic statistical techniques such as frequency and distribution. The finding found problems in software development related to monitoring practice still exist causing the failure in software projects. The finding of this survey had given important information for further survey in the area of monitoring the software development process.

Keywords- monitoring of software development; monitoring practice and software project management.

I. INTRODUCTION

The process of software development is very complicated and challenging especially in the aspect of meeting the required quality. Most of the software projects failed in various aspects. The failure to produce good quality software, delay in production, over budget and failure to meet the users' requirement are considered as software crisis [1,2]. Although there were various methodology and techniques had been introduced in software development, yet the failures in meeting the period of completion and over budget [3]. According to the survey [4] the expenses of software application throughout the world in 2012 was USD120.4 billion increase by 4.5 percent compare to the year 2011 only USD115.2 billion. For the year 2013, Gartner estimated the expenses for the software in Malaysia is RM3.3 billion [5].

The aspect of software project monitoring today is the important factors in software development process. Effective control and monitoring are among the factors of critical success in software project of management and development. This is due to the fact that the process of monitoring the plan does not affect the schedule and the cost of project but also improve the quality of software produced. The good planning would be useless without an effective monitoring. The planning and monitoring the progress of software development are the priorities in order to produce the quality software [8]. This factor is important for the project manager to make corrective measures if it is not in line of the original plan. This factor is

also to ensure the software projects continue to stay on the right path as planned.

The implementation of the system development project needs continuous and effective monitoring to ensure the said project can be carried out according to the time scheduled and the budget. Every project has life cycle and every stage of the project life cycle has activities and delivery which should be monitored. Monitoring and control of software project is very important process because it can detect deviation at an early which can effect on the project achievement and it also can help the project manager to take action accordingly [6]. In fact the monitoring of software project development helps to solve several issues related to software quality. If the process of monitoring the software development is not carried out accordingly various issues will arise affecting the quality factors such as usability, stability and maintainability.

II. METHODOLOGY

In general the empirical study with the method of survey has been carried out to study the current practice of monitoring the management of development projects in Malaysia. The main objectives of the survey are:-

- i. To identify the current practice of the management of development projects by the development organizations in Malaysia.
- ii. To identify the problems faced in the aspect of control and monitoring in management of software development projects.

iii. To identify the inputs for the needs of the model monitoring and development software.

A set of structured questionnaire comprising of 50 questions had been issued to study the issues of the organization, implementation of standard, procedure and monitoring process of software development. The questionnaire had been divided into three sections :-

- The background of the organization: This section monitored the general information of the organization such as office, experience, and numbers of development system and the percentage of the staff for the software development activities.
- Management of software project: This section consists of questions related to the use of methodology and implementation of management activities of software development.
- Control and monitoring of software projects: This section consists of questionnaires related to the use of procedure and standard, changes in management and the examination of the projects. Parts which had been monitored were methodology, management project plan, problems faced in project management and the needs of the monitoring system of the software projects.

III. DATA ANALYSIS

The respondents of this study were private sectors and government which had involved in the software development. 122 sets of questions had been sent to them. However only 48 organizations had given the feedbacks and findings of the survey had been analyzed using the method of basic statistics such as frequency and distribution.

A. PROJECT MANAGEMENT

1. The use of methodology

An effective project management is an important aspect to determine the achievement of the software development projects. Table 1 shows the use of project management methodology by the private organization and government in the development process. The findings found that 41.6 percent of the organizations adopted project management methodology in software development while 58.4 percent of the organization did not use management projects methodology in software development.

TABLE 1. Methodology

Methodology	Organization Category		Percentage
	Government	Private	
Yes	10	10	41.6%
No	11	18	58.4%
Total	21	27	100%

2. Types of methodology in project management

Out of 20 organization which used project management methodology, it was found that many used PMBOK methodology (12.5%) followed by PPISA (8.3%) and PRINCE2 (2.5%). Table 2 shows the type of project management methodology used by the organization in software development process.

TABLE 2. Type of methodology

Methodology	Frequency	Percentage
PRINCE2	1	2.5%
PMBOK	6	12.5%
PPISA	4	8.3%
ISO 12207	4	8.3%
Others	5	10.0%
No Methodology	28	58.4%
Total	48	100.00%

3. Obstructions towards the use of methodology

The organization which did not use project management methodology faced several factors obstruct the use of methodology. Finding showed that the factor of no expertise (53.5%) being the main obstruct factors towards the use of methodology. This finding is in line with the survey [7] which found that no expertise was the main factor obstruct the use of methodology. The respondent also found that the factor of too much delivery (50%) and the use of methodology will cause system delayed (39%) being the main cause obstruction the use of methodology.

TABLE 3. Factors obstruct the use of methodology

Factor	Frequency	Percentage
Lack of knowledge	6	21.5%
No expertise	15	53.5%
Cause delay	11	39.0%
Too many deliverables	14	50.0%

4. Expertise in quality assurance

In order to improve the quality of software, the expertise in quality assurance is very important. Finding showed that 16 organizations (33.3 %) did not have staff in the area of quality assurance while only 19 organizations (39.58 %) has less 25 % staff in the area of quality assurance. This situation showed that the aspect of quality assurance was not given much priority. Only 0.84 % of the organization had more than 50 % of their staff trained in the area of software quality assurance.

Percentage of Staff	Frequency	Percentage
No Staff	16	33.33
Less than 25%	18	39.58
25 - 49	9	16.60
50 - 74	2	0.42
More than 75%	2	0.42
Total	48	100.00

Figure 1. Expertise in quality assurance

5. The use of project management plan

Project management plan is an important document which includes various aspects in project management. Table 4 shows that 75 % of the organizations used project management plan. Yet it was found that there were organizations which did not use of project management plan in software development. This situation showed that the awareness towards the usage of project management plan existed among the organization in the implementation in software development, even though it was found that some organization did make use of the project management plan.

TABLE 4. Usage of project management plan

Usage	Frequency	Percentage
Yes	36	75%
No	12	25%
Total	48	100%

A. CONTROLLING AND MONITORING

1. Control and monitoring mechanism

Monitoring and control are important elements in management of software project. Table 5 shows that 62.55 % of the respondents had control mechanism and monitoring the development software projects. 29.9 % of the respondents came from the government sectors and 33.35 % from the private sectors. The finding showed that control mechanism and monitoring had been given attention which formed as factor in controlling in the development of software project.

TABLE 5. Control mechanism and project monitoring

Category of Organization	Yes	No	Frequency
Government	14 (29.20)	7 (14.55)	21 (43.75)
Private	16 (33.35)	11 (22.90)	27 (56.25)
Total	30 (62.55)	18 (37.45)	48 (100.00)

2. Checking and monitoring project status

Checking or review the status of the development of the project is important to ensure the progress of the project is in line with the original plan. The respondents had been asked how the checking of the software development had been

carried out and they had been allowed to choose more than one criterion how to carry out the checking. The survey found that periodic review (50 %) was the mostly adopted method to monitor the status of project development. However the survey found that 31.25 % of the organization only did the checking when necessary.

TABLE 6. Checking project management status

Criteria	Frequency	Percentage
Periodic Review	24	50.00%
Review base on necessity	22	45.80%
Review base on log issue	16	33.33%
Review when it necessary	15	31.25%
Others review	2	0.42%

3. Monitoring and control criteria

Control and checking also can be done for expenses, human resources, delivery and others. Table 7 shows that the checking of working schedule (75 %) was the main criteria in control and monitoring by the organization. The second highest criteria was the checking towards the factor of human resources (70.8 %), followed by cost factor (58.3 %) and others checking (8.3 %).

TABLE 7. Checking the status of project development

Criteria	Frequency	Percentage
Cost	28	58.3%
Human resource	34	70.8%
Job schedule	36	75.0%
Others	4	8.3%

4. Method to determine the achievement of software development process

The survey of software development can help management to evaluate the progress of project compared to the target of the planning. The respondents had been asked how the organization evaluates the progress of the process software development. Table 8 shows the only 19 of the organizations used the software to determine the achievement of the project. Majority of the organizations (46%) used their own formula to measure the achievement of the project.

TABLE 8. Method of determine the project achievement

Method of measuring	Frequency	Percentage
Use software	9	19%
Create own formula	5	10.5%
Informal estimation	22	46%
No measurement	14	29%
Others	3	6%
Jumlah Keseluruhan	48	100.00

5. Deviation factors in software development

The failure to meet the target of the project can be caused by several factors. This can cause deviation in the software development. The questionnaire forwarded to the respondent

allowed them to choose more than one factors which caused the deviation. The finding showed that not knowing the needs of the user (70.8 %) being the main factor causing deviation. Other factors were the weakness in planning (56.2%) and lack of expertise (41.6%). The finding also showed that none formal methodology contributes to the existence of deviation in software development.

TABLE 9. Factors of deviation

Factors	Frequency	Percentage
No formal methodology	15	31.2%
Weakness in planning	27	56.2%
Did not understand customer need	34	70.8%
Lack of expertise	20	41.6%
Others	6	12.5%

6. The use of standard control

The achievement of the software projects depend on various factors including project control, standard and procedure adopted. The respondents had been asked which model had their organization used to determine the software development process maturity. Figure 2 shows the analysis for the standard used. The finding of the analysis showed that the ISO standard had been used most (22.9%) compare to CMM (14.5%) and IEEE (2.1 %). The analysis also found that 39.6% of the organization did not use any standard to determine software development process maturity. 18.7 % of the organizations were keen to use their own standard. This situation revealed that the awareness of using the international standard among the organization of software in Malaysia was still low.

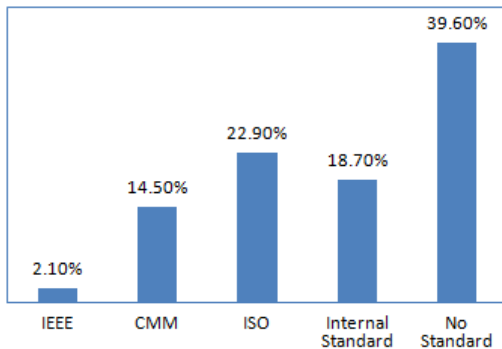


Figure 2. The use of standard control

7. The monitoring of software testing

The monitoring of software testing activities is important to detect error deviation in the process of software development. The finding showed that 38 organizations (79.1 %) carried out the monitoring towards the testing activities, while 10 organizations (20.9 %) did not doing the monitoring. Table 10 shows the method of monitoring the testing activities adopted by the organization. The finding of the survey found that the most of the testing was carried out by the organization themselves (47.36 %) while 39.47 % of the organization

carried the testing with the project manager. The testing also had been carried out by the outside parties which had been appointed by the organization.

TABLE 10. Monitoring of the testing

Method of monitoring test	Peratusan
Testing Team (without manager)	4 (10.52%)
Testing Team (with manager)	15 (39.47%)
Out side party (out source)	1 (2.63)
Done by the system development team	18 (47.36%)

8. Monitoring of software quality

Monitoring of the software quality is one of the priorities to develop the software required by the customer. Table 11 shows that 64.5% of the organization performed the monitoring of the software quality, while 35.5% of the organization did not so.

TABLE 11. Monitoring the quality

Monitoring the quality	Frequency	Percentage
Yes	31	64.5%
No	17	35.5%
Total	48	100%

IX. The experince of the team project in controlling and monitoring

Table 12 shows that 47.9 % of the organization has experienced staff in controlling and monitoring the software development project while 52.1 % of the organization did not have an experienced staff.

TABLE 11. Experience in monitoring

Experience	Frequency	Percentage
Yes	23	47.9%
No	25	52.1%
Total	48	100%

9. Problem in software project

Failure to deliver and meet the specific quality can cause a loss to the end user. The respondent had been asked regarding the problem which always occur during the process of software development. The findings showed that 89.6% of the software needed improvement after completion was the main problem faced. The second highest factor was that the end user were not satisfied with the completion time not followed the schedule (72.9%) and last followed by the dissatisfaction of the end user towards the quality of software (52.1%).

TABLE 12. Problem in software project

Problem in software project	Frequency	Percentage
Deliverable not follow the schedule	35	72.9%
Over budget	15	31.2%
End user not satisfied towards the software quality	25	52.1%
Improvement need in software	43	89.6%

10. Monitoring team

Monitoring will involve several team in order to ensure the progress of the project always had been evaluate. Questions posed to allow respondents to select more than one group undertaking the monitoring of projects undertaken. Figure 3 shows that the majority of the monitoring is done by the project manager (81.2 %), followed by the project leader (60.4 %). The study also showed the monitoring also involve stakeholders (16.6 %) to monitor the status of projects. In line with the findings [9] of which stakeholders are also involved in monitoring the progress of project.

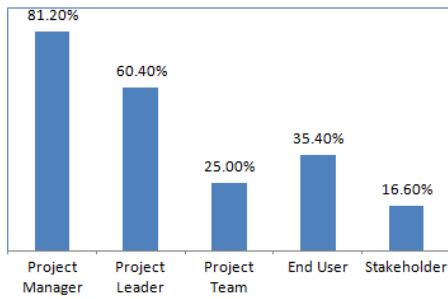


Figure 3. Software project monitoring groups

11. The use of software in the process of monitoring the software development

Various types of software in the market used in project management provide facilities such as provide project management in thr form of activities, date expectation of activities completed. Table 14 shows that 33.3 & of the organization used software to monitor the process software development. This showed that majority of the organization (66.7 %) did not use tool support in monitoring the process of development.

TABLE 13. The use of software in the process of monitoring the software development

Use of software	Frequency	Percentage
Yes	16	33.3
No	32	66.7
Total	48	100

IV. DISCUSSION

Findings from Section A answered the questions in the first survey to identify the current practices in management of software projects in Malaysia. Findings from Section B

answered the questions pertaining various problems in the aspect control and monitoring in the process of software developments. This finding were in line with [10, 11] which found that the success of software projects depend on various source including project control, methodology, software standard and procedure used. The findings of the survey revealed several important matter which should be given attention such as :

- a) The percentage of usage of methodology among the organization was still low where 54 % of the organization are not using the methodology in the management of software development project.
- b) No expertise and too much delivery is the main hiderence among the organization which did not use menthodology.
- c) The aspect of quality assurance was not be given priority. Only 0.82 % of the organization which had more 50 % of the staff been trained in the software quality assurance.
- d) The methods of measuring the project achievement had not been standardised in the organization. 29 % of the organization did not have specific method to determine the project achievement. 46 % of the organization adopted an informal formula while 10.5 5 of the organizations adopted their own formula to find out the achievement of the project.
- e) The standard of awareness towards the use of international standard model such as IEEE, CMM and ISO was still low among the aorganization of software development in Malaysia. It showed that 39.6 % of the organization did not used standard to determine the maturity of the process development in the organization.
- f) Finding showed that 89.6% needed improvement after the completion, delivery did not according the scheduled and dissatisfaction towards the software quality produce 52% were among the main problem faced by the project of software development.
- g) The deviation in the software development was caused by the factor of not knowing the needs of consumer or end user (70.8%), weakness in planning (56.2%) and lack of expertise (41.6%).
- h) Majority of the organization of software development (66.7%) did not use tool support to monitor the process of software development.

V. CONCLUSION

In general, the findings of the survey showed that monitoring was important in the process of software development. Imperical study which had been carried succeeded in surveying the process of monitoring of software

development in Malaysia. Finding showed that problems still pre valid in software development related to monitoring practice. The standard of monitoring was still low. Majority of the organization did not use any instrument to monitor the status of project development. The survey also showed that monitoring was important and needed an effective monitoring mechanism to help the project managers in software development. Monitoring the cost factor, human resources and planning were still inadequate. This showed that the process of software development was still low in the monitoring the projects which caused failure in software projects. The finding of this survey had given useful informations for further study in the area of monitoring the process of software development.

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