

The 5th International Conference of Euro Asia Civil Engineering Forum (EACEF-5)

The practice of time management on construction project

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Abstract

The Malaysian construction industry plays a vital role in the country development. CIOB in 2008 [1] has indicated that the quality of time-management on construction projects is generally poor. Therefore, an effective time management for the construction project is important in managing risk of the delayed completion project. The aim of this project is to examine the practice of time management on construction project. The objectives of this study are to assess the respondents' participation in the planning of construction works, to investigate how progress records are kept and to identify the process of monitoring the progress of work on the construction industry. To achieve these objectives, there were thirty questionnaire sets distributed to the respondents. From the findings, the project manager has the highest percentage in both drafting a planning method statement and project planning meetings. Most of the respondents had their experience of the sequence was planned as a result of a discussion and written method statement, the activity durations being calculated in whole or in part, the price was allocated in separate documents with contingency, date constraints were used constraint the performance to the dates given in the contract documents and float constraints were used to control critically. As for the progress reports, the majority prefer to keep the records on the paper but were immediately input into the database. Most of them had the experience of additional work related to labour allocation. When it came to relating the resource used to the work done and in which location, it was the experience of majority respondents identified task on schedule for both labour and plant and equipment records. The respondents preferred to report the progress in meeting or correspondence and the schedules were updated monthly. Lastly, most of them have corrected the logic to conform to progress achieved to deal with consequences of out of sequence work.

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Peer-review under responsibility of organizing committee of The 5th International Conference of Euro Asia Civil Engineering Forum (EACEF-5)

Keywords: time management; planning; progress records; monitoring; delay

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1. Introduction

Construction industry only contributed only around 3 percent to the Gross Domestic Product in the year 2010 but however it makes up an important part of the Malaysian economy due to the involvement with other industry branches such as the metals processing industry and the mechanical engineering or the tourism sector. Therefore, the construction industry is a substantial economic driver for Malaysia (ANK Malaysia, 2012) [2]. But however, construction has been facing numerous issues and one of them is time management issues which have cause delayed completion of a project [3, 4]. According to Westland [5], time management is the process of recording and controlling time spent by staff on the project. The issues are poor management of time, choice of procurement methods, participation of shareholders, poor planning of construction works, lack of implementation of software, poor site records and etc. Thus these issues can lead to delays are insidious often resulting in time overrun, cost overrun, disputes, litigation, and complete abandonment of projects [5]. Hence, this paper will look into the issues mentioned to minimize and avoid delay in any construction project. A research conducted by the Chartered Industry of Building (CIOB) [1] in 2008 has indicated that the quality of time-management on construction projects is generally poor. The research also indicates that the growth in training, education and skill levels within the industry in the use of time-management techniques has not kept pace with the technology available. In addition, there are also very few projects are currently managed by reference to modern methods of time control. Ahmed et al. [6] found that delay happen in every construction project and the magnitude of these delays varies considerably from project to project. Some projects are only a few days behind schedule and some are delayed by over a year. Also, conflicts in shareholders are one of the factors of unsuccessful projects. El-Razek et al [7] identified that different parties of construction in Egyptian construction projects do not agree with each other on the importance of various factors of delay, and they mostly blaming each other of delays. He too finds that team effort is vital in the success of a project. Liberatore et al [8] has mentioned that high percentage of the construction respondents used project management software for general work planning or presentation. Thus this has shown the importance of use of project management software in construction works. Also, Scott and Assadi in [9] has stated that majority of respondents did not keep records of progress that show each of the work activities on the contractor's programme, exactly when work took place. The problems were lack of an organized and formalized approach, lack of clear rules and guidelines on how the records are kept and organized, difficulties in ensuring the consistency of reporting by various responsible individuals, inexperience staffs and etc [9]. Therefore, the importance of project control techniques in managing time to improve the risk of delayed project are needed to be known and recognize so that the risk of project delayed can be minimized.

The aim of this study is to examine the practice of time management on construction project and the objectives of this study are to assess the respondents' participation in the planning of construction works; to investigate how progress records are kept on construction industry and to identify the process of monitoring the progress of work on construction industry.

Successful project management insures the completion of project in time, within budget, and to the project specifications. Therefore, this study is significant to investigate on how time is managed on construction industry. So that the managerial staffs can get a clear understanding on time management and they are able to prevent them early. Shareholders need to know their roles and their responsibilities. Construction works need to have a good and detail progress records to deal with future claims. This study is to let the managerial staff to know the importance of monitoring the progress of work on construction industry. Lastly, this study can become a guideline for future development in other possible areas.

2. Literature Review

A project is a collection of activities to achieve a specific objective. Project management involves project planning, monitoring, and control. In project planning, it includes definition of work specification, determination of quantity of work, and estimation of resources required [10]. In project management, time management together with cost management is the most visible area. The initial objectives of time management are to control time and prepare schedules, networks and so on [11]. Mackenzie [13] tells a wider definition for time management: "Time Management is the function required to maintain appropriate allocation of time to the overall conduct of the project through the successive stages of its natural life-cycle, (i.e. concept, development, execution, and finishing) by means of the

processes of time planning, time estimating, time scheduling, and schedule control.” Project time management needs the use of tools and policies in order to create a standard for monitoring and measuring project work. Both the individual and assigned tasks must be able to capture and manage time by utilizing the tools in this process [14].

Effective time management is vitally important for construction project. CIOB [1] has discussed three ways to indicate how project was being managed which are procurement methods, time management methods and principle tools for time management. CIOB [1] has identifies eight types of procurement methods which are bespoke contract, partnering, lump sum, design and build, target cost, re-measure and construction management. In Malaysia, type of procurement systems that commonly used in Malaysia nowadays are traditional system, design and build method, management contracting method and professional construction management method [15]. Maizon [16] states that the inappropriateness of the procurement systems that have been chosen for the construction projects is recognized as one of the principal reasons for the construction industry’s poor performance. As for the principal tools, a research conducted by CIOB [1] has listed out 8 types of tools for time management: (1) A bar-chart, (2) Partially linked network, (3) Fully linked network, (4) Time chainage diagram, (5) Line of balance diagram, (6) Flow chart, (7) Minutes of meetings, (8) Correspondence. The result shows that respondents were familiar with the use of a simple bar chart as a time-management tool while some were familiar with using other methods of communicating their intended progress, without reference to a schedule of any sort.

A stakeholder can be defined as anybody who has an interest in the project, its work, outputs, outcomes or ultimate goals. Therefore, different shareholders have different perspectives on the success criteria of a project [17]. Lo et al. [18] has identified 30 causes of delay in Hong Kong construction projects which some of the 7 categories are related to shareholders. The 7 categories are client related, engineer related, contractor related, human behavior related, project related, external factors and resource related. Commitment from all parties involved is important for any project to complete successfully [19].

Site records have a range of information relating to finance, quality and progress. As for the progress records, they include particulars showing what happened, when it happened, the resources used and any disruption or delay. These records are maintained with purposes such as providing a means of monitoring and controlling the construction process. Thus they have vital roles in resolving construction conflicts and disputes [9]. One of the most important tasks of construction project management is project progress monitoring and control. Every team member know the project progressing, where they are currently in comparison to the initially set plans, whether deadlines are met, budgets are safely measured and followed [20].

3. Methodology

In order to achieve the first objective, a review of the literature is conducted to investigate further awareness in the industry of time management issues. To achieve second and third objective that need the questionnaire survey in order to investigate how progress records are kept and to identify the process of monitoring the progress of work is done on construction industry. Generally, the questionnaire designed for this study consists of three parts where each part of the questions will reflect to the competency that have been stated above, namely Part A – Parties’ Involvement on the Planning of Constructions Works, Part B - How Progress Records are Kept and Part C - The Process of Monitoring the Progress of Work. The method of analysis for this study is using SPSS. The benefit of using SPSS is easy to determine frequency distribution during questionnaire analysis. Frequencies statistic were used to obtain frequencies of a set of selection. The highest frequency of a selection means it’s a favourite selection by respondents. Furthermore, according to Morgan et al (2007), frequency analysis is a tally or count of the number of times each score on a single variable occurs. The frequency result can be chosen either in percentage of respondents (%) or number of respondents. For better and easy understanding the result data transform into bar charts and pie charts.

4. Results and Discussion

This study was conducted to examine the practice of time management on construction projects. Thus 30 questionnaires sets were distributed to the construction companies where Kuala Lumpur, Johor Bahru and Sabah responded. The results from the questionnaires obtained was analyzed and discussed based on the three objectives of the study.

4.1. Finding 1: To assess the respondents' participation in the planning of construction works

Objective 1 was to assess the respondents' participation in the planning of construction works. Choosing the right project control techniques to suit the process in managing time is important as it will assist in managing the risk of project delayed. The selection of the proper analysis method depends upon a variety of factors including information available, time of analysis, capabilities of the methodology, and time, funds and effort allocated to the analysis [21]. Based on the 30 sets of data collected from the surveys, below are the results for this objective. The analysis of responses in fig. 1 showed that a large proportion, 18.45% of all projects was currently being constructed under traditional contract. The bar chart was the most favorite tools for time management used by respondents which were 29.33%. About 26.67% of respondents were familiar with flow chart while none of the respondents had used line of balance in their projects. Minutes of meeting were a popular tool for time management task which has 24% of respondents using it. Other tools for time management were correspondence (8%) and fully linked network (8%). The most popular softwares used by respondents to prepare construction schedules were Excel and Microsoft Project which has 43.55% respectively. Other softwares were less used by respondents such as CA Superproject and Pertmaster. About 11.29% of respondents have used Primavera and PowerProject (1.61%) in planning their projects.

Table 1 clearly has shown that project manager has the highest percentage in both drafting a planning method statement and project planning meetings. Based on Nash et al [22], the Project Manager was indicated as having a consistent high level of power over the three phases which were pre-contract phase, pre-construction phase and construction phase. Overall, majority of the respondents answered these part of questions had their experience of sequence was planned as a result of a discussion and written method statement as stated in Fig. 2. In figure 3, most of them experienced the activity durations being calculated in whole or in part. Also, Figure 4, the majority of respondents (64.29%) had experienced that the price were allocated in separate documents with contingency while only 7.14% of respondents had not experience in pricing the values of activities. In identifying logic in construction schedules (Figure 5), most of them identified the logic by having meetings with construction manager and other interested parties.

The majority of respondents used date constraints to constraint the performance to dates given in the contract documents while more than half of the respondents said in their experience these float constraints were used to control critically. Date constraints are used to override the logic of a schedule (if any) and to force an activity to start by, on or after a specified date. About 60.53% said that they had experienced date constraints to constraint the performance to dates given in the contract documents. The effect of using date constraints to constraint the performance dates would be to hold those milestones to the stated dates on the schedule, irrespective of whether the activity durations, coupled with the logic of the schedule (if any) would predict that the dates could be met. 26.32% of respondents had experience that date constraints were to be controlled critically. Only 2.63% of respondents said that it was left entirely to the project scheduler as to whether and if so, how date constraints were used. Float constraints are used to override the logic of a schedule (if any) and to force the removal of free or total float from a path where the logic of the schedule would dictate otherwise. About 17.95% were aware that the use of float constraints was forbidden. Only about 5.13% said that in their experience it was left to the project scheduler to determine how float constraints were used. 53.85% of respondents said in their experience these constraints were used to control critically. There were 23.08% of respondents who were familiar with float constraints being used to identify dependant predecessors.

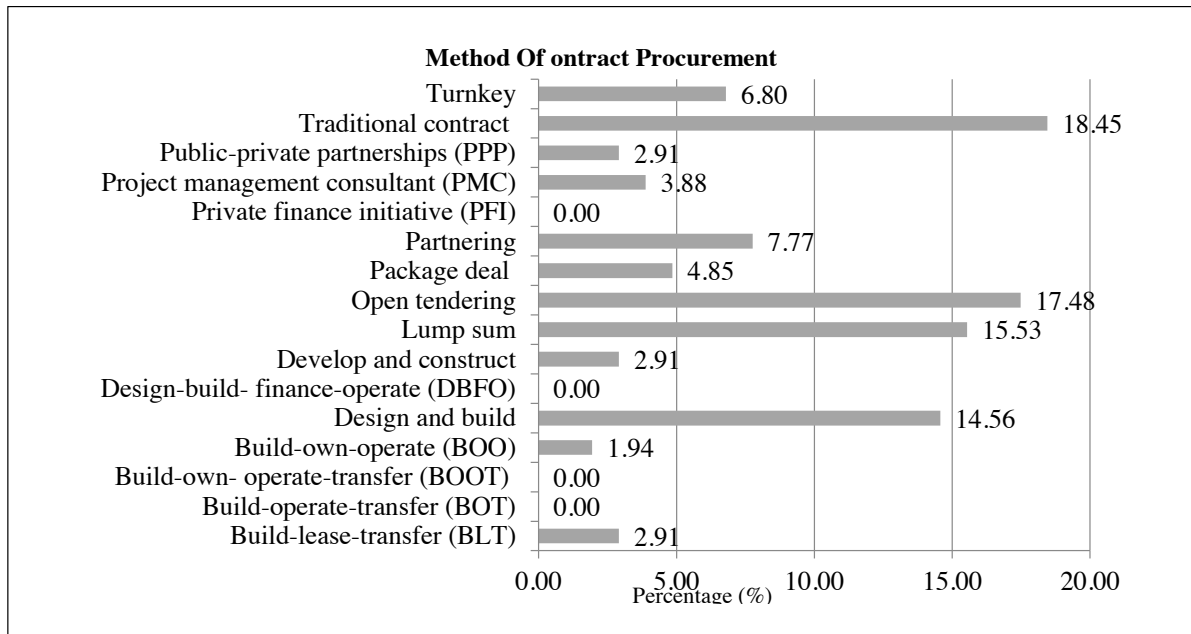


Fig. 1. The percentage of respondents involving in the method of procurement

Table 1. Parties who are usually involved in drafting a planning method statement and project planning meetings

Parties	Drafting a planning method statement (%)	Involved in project planning meetings (%)
Architect	6.71	4.68
Client	13.41	9.36
Contract manager	5.49	-
Foreman	0.00	0.00
Mechanical and electrical engineer (M&E)	13.42	7.02
Project manager	14.63	15.20
Quantity surveyor	6.10	5.26
Relevant specialist/subcontractor/supplier	6.71	4.09
Scheduler	7.93	10.53
Site engineer	-	11.70
Site Supervisor	-	6.43
Site manager	9.15	12.28
Structural engineer	7.32	7.02
Sub-contractors	7.93	6.43
Tradesman	1.22	0.58

When it came to relating the resource used to the work done and in which location, it was the experience of only 34.43% of respondents to this survey that the task description was identified. 26.23% of respondents reported that the area description was recorded in the same way as that on the construction schedule to which the labour has been applied. In the experience of 16.39% of the respondents the labour resource records were related to a task description held in a different document while 14.75% said that a work area description was contained in a different document. In

the experience of 6.56% of respondents the details of the area being worked on were identified in the record while only 1.64% reported a work area description having no relationship with anything. held in a different document while 14.75% said that a work area description was contained in a different document. In the experience of 6.56% of respondents

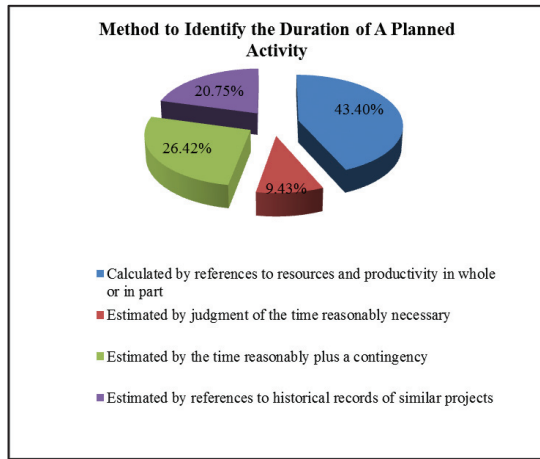


Fig. 2. Establishment of the planned sequence of work.

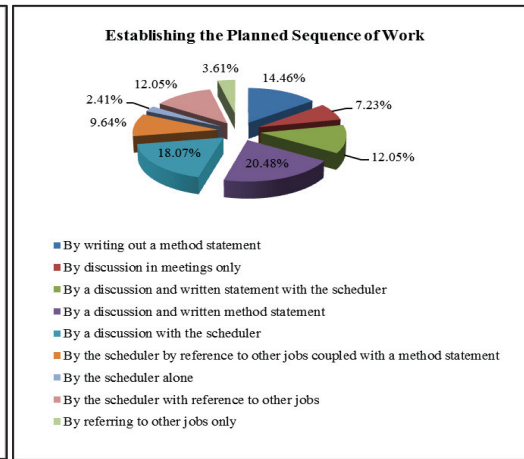


Fig. 3. Method to identify the duration of a planned activity

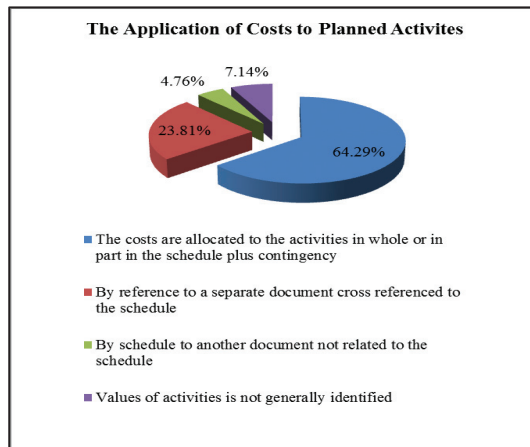


Fig. 4. The application of costs to planned activities

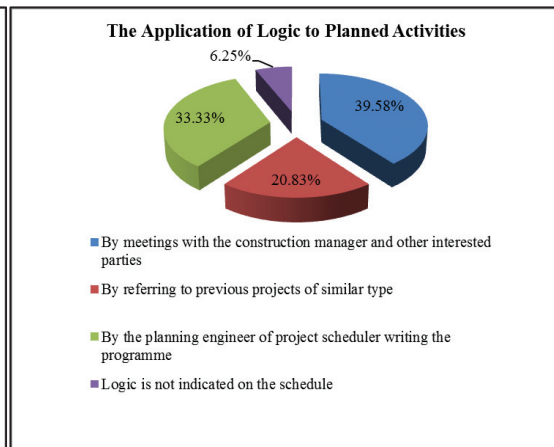


Fig. 5. The application of logic to planned activities.

Around 26.74% reported that the details of the date were kept in plant and machinery records while 20.93% reported that details of the day of the week to which the record related were recorded. 29.07% reported that details of the name of the type of plant were kept, with 23.26% reporting that details of the trade to which it related were kept. As for plant and equipment work data, both of 13.33% of cases were related to a task description and area description on another document. In 6.67% of responses, the plant and equipment resources were related to a task description. However, only 3.33% respondents to this question had experience of a work description with no relationship to anything.

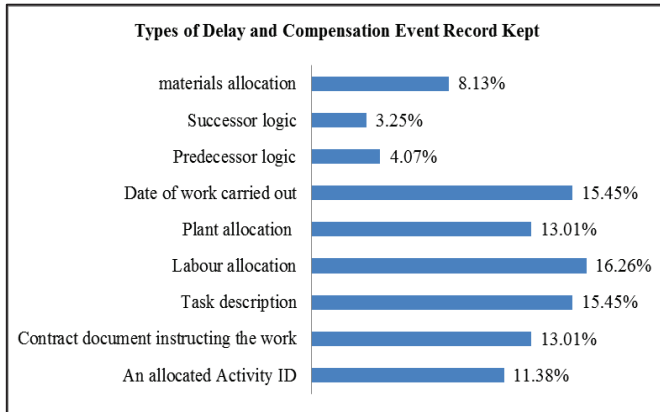


Fig. 6. Type of the progress report kept in the company

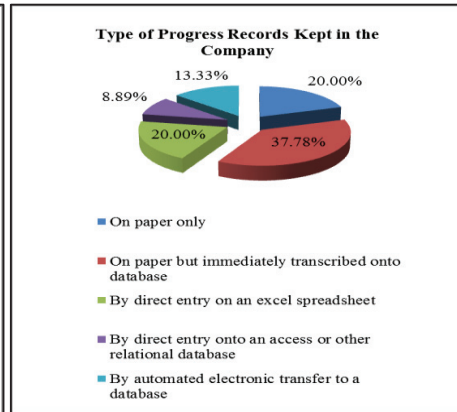


Fig. 7. Type of delay and compensation event record kept.

4.2. Finding 3: To identify the process of monitoring the progress of work on construction industry

Objective 3 was to identify the process of monitoring the progress of work on construction industry. Al-Jibouri in [23] has stated that project's progress is needed to be monitored and compared as the work proceeds in order to identify and measure these differences. Only 8.16% had experience in the use of earned value as a measure of progress in the design stage. 20.41% reported that the degree of progress made was estimated by reference to identifiable stages of design and 51.02% of design work to be done. The majority of respondents (37.50%) did not have experience of the reporting of the progress of the project as a whole. 41.67% of those indicated that progress was either reported against the first schedule or the last revised schedule. Only 6.25% were familiar with progress being reported in the period since the last report. All of the respondents in their experience had updated the schedule. 22.64% had experience of the schedule being updated at fortnightly intervals. 35.85% of respondents had the experience of updating the schedules monthly. It was the experience of about 15.09% of respondents that the schedule was updated when requested by contract administrator while 24.53% when requested by the client. Only 1.89% of respondents had the experience of updating the schedules when chosen by the contract management team. Also, 72.97% of respondents experienced the updating of the schedules a straight, date-related status line with the work actually done to the left of the line and the work to be done to the right of it and the schedule re-sequences. Lastly, the respondents experienced in dealing the consequences of out of work sequence in the project were by taking priority of logic (40.9%), planned logic taken in precedence to progress achieved (38.6%) and Logic corrected to conform to progress achieved (20.5%).

5. Conclusions

From the surveys, it is shown that project manager is important in the planning of construction works. Most of the respondents had their experience of sequence was planned as a result of a discussion and written method statement, the activity durations being calculated in whole or in part, the price were allocated in separate documents with contingency, date constraints were used constraint the performance to dates given in the contract documents and float constraints were used to control critically.

From these findings, most respondents know the importance of progress reports by keeping the records on paper and were quickly input into database for future purposes. Also, the majority of the respondents were familiar with labour allocation records being kept when work was carried out. This shows that they are aware of the records being kept of compensation or delay-related events. It was the experience of majority respondents identified task on schedule for both labour and plant and equipment records when it came to relating the resource used to the work done and in which location.

Lastly, most respondent least use earned value as a measure of progress in the design stage. They preferred to report the progress of the project as whole and updated the schedules monthly. In updating or monitoring schedules, they updated the schedule by preferring the schedules as a straight, date-related status line with the work actually done to

the left of the line and the work to be done to the right of it and the schedule re-sequences. This would show the effect upon timing of the remaining planned activities of the progress estimated to have been achieved to date. Most of them have taken priority over planned logic to deal with the out of sequence works.

References

- [1] Chartered Industry of Building (CIOB), 2008. Managing the Risk of Delayed Completion in the 21st Century.
- [2] ANK Malaysia (2012). Market Watch 2012-Construction Industry in Malaysia. Available from: http://www.malaysia.ahk.de/fileadmin/ahk_malaysia/Market_reports_2012/Market_Watch_2012_-_Construction.pdf [Assessed on 6/5/2013].
- [3] Yusof, W.Z.W., Singh, B., Hamid, A.R.A. and Ahmad, W.R.W. Variation Order Problem by Client During Construction , paper presented in Civil Engineering Research Seminar (SEPKA 2004), FKA & Construction Focus Group, Dewan Alumni UTM, Skudai.1: 294-308.
- [4] Singh B., Hamid A.R.A. & Yahya F.R. The influence of human factor in construction worker's productivity, paper presented at Persidangan Kebangsaan AWAM'07 organized by Pusat Pengajian Kejuruteraan Awam, USM, Hotel Helang , Pulau Langkawi. 1: 946-954.
- [5] Westland, J. (2006). The Project Management Life Cycle: A Complete Step-by-step Methodology for Initiating Planning Executing and Closing the Project. Kogan Page Limited, London, UK.
- [6] Sambasivan, M., Soon, Y.W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management* 25, 517–526.
- [7] Ahmed, S.M., Azhar, S., Kappagntula, P. and Gollapudil, D. (2003), "Delays in construction: a brief study of the Florida construction industry", *Proceedings of the 39th Annual ASC*.
- [8] El-Razek, A.M.E., Bassioni, H.A., Mobarak, A.M. (2008). Causes of delay in building construction projects in Egypt. *Journal of Construction Engineering Management* 134, 831–841.
- [9] Liberatore, M. J., Pollack-Johnson, B., & Smith, C. A. (2001). Project management in construction: software use and research directions. *Journal of Construction Engineering and Management*, 127(2), 101-107.
- [10] Scott, S., & Assadi, S. (1999). A survey of the site records kept by construction supervisors. *Construction Management & Economics*, 17(3), 375-382.
- [11] Babu A.J.G., Nalina Suresh, Project management with time, cost, and quality considerations, *European Journal of Operational Research*, Volume 88, Issue 2, 20 January 1996, Pages 320-327, ISSN 0377-2217, 10.1016/0377 2217(94)00202-9.
- [12] Vargas, R.V. (2008), *Practical Guide To Project Planning*, New york, Auerbach Publications, print.
- [13] Mackenzie, R. A. (1990). *The time trap*. New York, NY: AMACOM
- [14] McGraw, B.A, Leonoudakis, R. (2009). *Project Time Management: The Foundation for Effective Resource Management*. Available from: http://www.rbryanpeterson.com/files/Project_Time_Management_v2_2_Feb_2009-1.pdf [Assessed on 15/04/2013].
- [15] Rashid, R. A., Taib, I. M., Ahmad, W. B. W., Nasid, M. A., Ali, W. N. W., & Zainordin, Z. M. (2006). Effect of procurement systems on the performance of construction projects. Department of Quantity Surveying, University of Technology, Malaysia.
- [16] Maizon, H. (1996), "The Effects of Procurement Systems on performance of construction projects in Malaysia, *Proceedings of CIB W92: North Meets South: Developing Ideas*, The University of Natal, Durban, South Africa.
- [17] Turner, J.R. (2009), *The Handbook of Project Based Management: Leading Strategic Change In Organization*, 3rd edition, United States of America: McGraw-Hill, print.
- [18] Lo, T.Y., Fung, I.W.H., Tung, K.C.F. (2006). Construction delays in Hong Kong civil engineering projects. *Journal of Construction Engineering Management* 132, 636–649.
- [19] Iyer, K.C., Jha, K.N. (2005). Factors affecting cost performance: evidence from Indian construction projects. *International Journal of Project Management* 23, 283–295.
- [20] Zubair, A. M., Zaimi, M., Majid, A., & Mushairry, M. (2006). A systematic approach for monitoring and evaluating the construction project progress. *The Journal*.
- [21] Arditi, D., Pattanakitchamroon, T. (2006). Selecting a delay analysis method in resolving construction claims, *International Journal of Project Management* 24, 145–155.
- [22] Nash, S, Chinyio, E, Gameson, R and Suresh, S (2010). The dynamism of stakeholders' power in construction projects. In: Egbu, C. (Ed) *Proc 26th Annual ARCOM Conference*, 6-8 September 2010, Leeds, UK, Association of Researchers in Construction Management, 471-480.
- [23] Al-Jibouri, S. H. (2003). Monitoring systems and their effectiveness for project cost control in construction. *International Journal of Project Management*, 21(2), 145-154.