

Effects and Causes Analysis of Building Construction Delay project in Bangkok Metropolitan

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Abstract:

Delay problems occur frequency in life-cycle during the project task and leading to potential impacts to the project expectation either additional costs or extension of time deliverable in the project. Therefore, it is necessary to examine and analyze causes and effects of construction delay. The aim of this research is to investigate the major causes and effects of delay problems on high-rise building construction project in Bangkok. This research presents thirty-three causes and nine effects retrieved from literature review. The questionnaire survey and interview are used in this research to investigate deeply information. The questionnaire survey was distributed to fifty-one respondents who posited owner, consultant, and contractor at site-working project. The interview process was represented by project manager and consultant who is expert position in Noble Ploenchit project where located in Bangkok, Bangkok. Furthermore, Relative Importance Index was used to analyze and calculate to the highest ranked of causes and effects of delay in Thai construction project. From the factor analysis, the results showed that mostly significant factors of construction delay were: (1) change orders, (2) financial problem of contractor, (3) slow decision-making, (4) shortage labors, (5) improper planning, (6) lack of good communication, (7) third party delay such as subcontractors or supplier, (8) unclear with shop drawing design, (9) shortage of construction materials and (10) late payment by owner. In terms of potential effects in this research, the results indicated that five highly ranking as delay in obtaining funds and profits both owner and contractor, cost overrun, time overrun, low quality due to hurry and arbitration. These findings are expected to be essentially encouragement to Thai construction industry in order to find the solution in the delay problem.

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I. INTRODUCTION

Fundamentally, when the projects are delayed, that would lead the impacts to the project expectation both of additional costs or extension of time deliverable in the project. Several scholars have mentioned that the causes of delay in many countries. For instance, Shaikh et al (2010) stated that the delay is a one of the most important and serious problem which impact the time schedule and relating the cost in the high building construction; Assaf & Al-Hajji (2006) defined that the influence of delay factor affected the time overrun either further completed date specified in a contract or

beyond the date that other parties agreement upon a deliverable of the project goals; Stumpf (2000) mentioned that “ the delay as an act or event that extends the time required to perform the tasks under a contract” and therefore, he said that the delay is a matter that analyses for the different situations. Even if the advances technology and understanding a good project management technique, the construction projects still continue to suffer the delay problems and overdue completed project (Stumpf, 2000). Consequently, the delays are now becoming a major factor of conflict in construction industry and also one of the most difficult to resolve because the

construction is a large-scale framework (Pickavance, 2010). the construction project may obtain an enormous damaged when there is the delay problem existence. Construction delay do not only result in cost overruns, extended schedule timeline and poor quality but also greater disputes (Al-Khalil & Al-Ghafly, 1999), even total abandonment and protracted litigation by the other parties (Aibinu&Jagboro, 2002). Although, in many cases, the preliminary contract is noted that the adjustment if there is a delay beyond the contract, the contract parties through claim under agreement upon the extra costs and time extension associated with the delay. However, in fact, the contract parties often avoid and do not want to responsible for the damaged that incurred as well as raising the conflict within an argument between the owner and contractor to claim the extra costs (Sambasivan& Soon, 2007).

In particular, several previous studies over the last two decade have shown a range of problems that the delay became the most popular topic in all types of construction projects along within many developing countries (Marzouk & El-Rasas, 2014). Actually, in the era of globalization, the skyscraper construction projects are regarded to become a substantial contribution for developing economic, challenges have also equally soared (Chan et al., 2008). Thus, the volume, complexity and requirement have also grown over time in high-rise building industry in many countries including Bangkok. Interestingly, Toor &Ogunlana (2008) found that “scarcity of construction materials and human resources has intertwined with existing socio-economic and political problems of developing countries resulting in added pressure on the construction sector”.

Focusing on reducing the delay problems is efficiently to reduce the timeline and resources in high building construction project in order to achieve the construction delay process. Therefore, the purposed of this research aims to explore the major caused of delay in high-rise building construction in Bangkok as well as to identify the potential impact of such delay. Due to there is a dearth of such

studies from the perspective of the high building construction in Bangkok.

II. LITERATURE SURVEY

Buildings research background

In globalization and modern business era, the high-rise building is one of a significant element to achieve either economic or urbanization in many developed countries. The skyscrapers were built in enormous countries and have been raised continuously in order to stimulate the commercialism and also challenges equally soared (Farouk, 2011). There are many reasons that why the tall buildings are given an emphasis in modern urbanization. According to Beedle, Ali & Armstrong (2007) the two main reasons are apparently:

“First, the exploding population, largely urban, creates an increasing demand for tall buildings. The ever-increasing population and growing economies in major cities of the world mean increasing urbanization globally and the continuing rise in population density in urban areas. Arable land areas are constantly being eaten away by urban spreading through suburban developments. The tall building can accommodate many more people on a smaller land than would be the case with low-rise building on the same land. A tall building is in effect a vertical transformation of horizontal expansion.

Second, it is generally [acknowledged] that there has been evident neglect of the human factors in urban design at the expense of livability and quality of life. The outward expansion of cities into the suburbs has resulted in increased travel time and traffic gridlock. The prospect of traveling for a long time, to and from work, is detrimental to social well-being of the commuter and results in losses of fuel and productivity. Clustering of buildings in the form of tall buildings in densely built-up areas is the opportunity for creating open spaces like playgrounds, plazas, parks, and other community spaces by freeing up space at the ground level. Besides the impact on the city skyline, tall buildings thus influence the city fabric at the level where they meet the ground. The improvement of the “public

realm” has become a necessity exerted by planning authorities in major cities”

From, it showed that the globalization processes have a substantial influence that affect to the spreading of skyscrapers in major cities nowadays. At the same time, the globalization also has established as an implementation for a new innovation to improve an opportunity and openness of the modern business particularly from the Western culture (Kojm, 2012). In addition, Ali, Al-Kodmany & Zhang (2013) stated that the outcome of skyscrapers expansion is shown as the growth of wealth in economic benefits in terms of global tourism and political views that representation as a meaning for promoting places through the symbols of prosperity in cities. For instance, Dubai is denominated as the prosperity city from an enlargement of skyscrapers in order to express the aspiration of the wealth place. The view of Dubai’s ambitions is illuminated by the growth of numerous skyscrapers after the 20th century which creates the Dubai’s image where the fastest, biggest and most amazing are essentially to the consolidation of the achievement Dubai brand through the world tallest building, Burj Khalifa (Acuto, 2010). Identically, Shanghai wanted to boost its status and communication into a center of the global commercialism in terms of world economic, industrial furtherance and scientific advancement. The background of the growth of skyscrapers in Shanghai (as shown in figure3) is becoming a pride of China to contribute to global recognition for regaining as a great economic power and the adoption of expectation from international (Acuto, 2010). Consequently, Shanghai improved economy growth rapidly and became the hub of economic, commercial, financial and industrial either China or mighty countries due to the explosion of a number of skyscrapers so that could gain more confidence and attach foreign investors into Shanghai, as a result, people’s lives are improved by the growth of the economy in terms of more income and social sector (Acuto, 2010).

Caused of construction delay

Doloi et al. (2012) found that the significance of delay factors in Indian construction from the questionnaire surveys and personal interviews. From the factor analysis, the most crucial of delay factor were extracted as lack of commitment, inefficient site management, poor site management, improper planning, lack of good communication and substandard contractual. With an investigation the causing delay factor in Hong Kong, Chan & Kemaraswamy (1997) noted that the survey’s result indicated the five principal and mutual causes of delay were: poor site management and supervision, slow decision-making from project participants, client-initiated variations, unforeseen ground condition and required variations of works. In Egypt, Amer (1994) considered the major delay causes in construction projects which are: poor contract management between owners and contractors, delay in financial payment for completed work by owners, design changes during the construction, partial payments during the construction and unrealistic scheduling. Sambasivan & Soon (2006) indicated that the ten most considerable delays in Malaysian construction industry which are: contractor’s improper planning, contractor’s poor site management, insufficient contractor experience, inadequate client’s finance and payment for achieved work, incompetent of subcontractors, shortage raw materials, shortage labor, equipment available and failure, lack of communication between parties and error during the construction stage.

From, the causes of delay can be occurrence by many factors from different countries. In order to identify the major causes of delay, the delay is categorized into various factors for exploration the significant problems from each type which related the delay as numerous researchers have studied. For instance, Marzouk & El-Rasas (2014) classified the delay causes in Egyptian by categorized 7 groups as: owner related, consultant related, contractor related, material related, labor & equipment related, project related, and external factor related. Similarly, Assaf & Al-Hejji (2006) investigated causes of delay in

Saudi Arabia by listed seventy-three causes of delay categorized into nine groups as: owner, contractor, consultant, design, project, materials, equipment, labor and external factors. At the same time, Doloi et al. (2012) studied the factors affecting delay in Indian construction project by separated attributes affecting delay into six groups as: project related, site related, process related, human related, authority related, and technical issues. As a consequence, these factors will be designed to questionnaire survey in Bangkok in order to analyze the major cause what is occurrence in Thai construction projects

Identically, there are a number of previous articles that concerned with the scope of delay topic in construction industry in Bangkok. Doloi et al. (2012) identified the cause of delay in 12 high-rise building project in Bangkok in order to determine the trouble that generated delay for construction in developing Bangkok's economy. They stated that "the resource supply problems" were the most acute problem for Thai construction in that year. Due to shortage materials, particularly cement and over-stretched and technical personal in suppliers firm, the construction projects suffered the delay and severe impact. Ogunlana et al. (1996) said that "the result was that many projects were poorly managed and exceed time forecasts in this circumstance". Likewise, Toor & Ogunlana (2008) also conducted the problems causing a delay in major construction projects in Bangkok. The issues such as lack of resource, poor contract management, shortage labor, planning and scheduling deficiencies, change order and contractor's financial difficulty were highlighted among the top problem within factor related to designers, contractor and consultants. Makulsawatudom, Emsley & Sinthawanarong (2004) studied the critical factors that influencing construction productivity in Bangkok. They disclosed that the ten most crucial factors affecting the construction productivity were lack of materials, incomplete drawings, incompetent supervisors, lack of tools and equipment, absenteeism, poor communication, instruction time, poor site layout,

inspection delay and rework during the operation. From previous studied that relevant the delay factor in Bangkok, it can seem that lack of resources and the quality of personnel are a major cause of delay with the construction industry in Bangkok.

On the other hand, there are some researches showed that not only shortage resources/materials is a major caused of delay in Thai construction but also fragmented coordination between project participant is commonly known as a regular problem in construction projects. For instance, Suksai et al. (2015) examined the delay factors between main contractors and nominated subcontractor in high-rise building in Bangkok. The result showed that critical delay factors consisted of poor working together as a team-work and inadequate in skill of communication and coordinate between main contractors and subcontractors. In order to support the theory of fragmented coordination in Thai construction, Ogunlana & Promkuntong, (1996) listed the three main issues that caused of delay and poor performance in Thai construction projects as: resource shortages, problems caused by owner and consultants and problems caused by contractors. In addition, due to lack of communication and relationship between project participate that caused the delay and poor performance in Thai construction, Chavalitmotien (2013) showed the diagram by divided the sequence of fragmentation into four main delay causes (as shown in figure 1).



Figure 1: Sequential relationship of delay/poor performance in Thai construction project.

Source: Chavalitmotien, (2013).

As a result, the previous studies can seem that the delay problems could be occurring from many factors in each country particularly in Bangkok. The results show that the shortage resources, change

orders, poor communication and fragmented coordination between each party that are the major caused of delay in Thai construction, whereas the main reason that caused by the communication and relationship of involved three main parties as owners, consultants and contractors. In order to analyze the actual delay that appeared in high-rise building in Bangkok, these previous research could be useful for performance assessment and could also be adjusted to design the primary research in order to evaluate the performance of Thai construction projects.

Effects of delay problem

From aforementioned, the delay problem is commonly known as a significant problem in construction industry. Therefore, the previous research of the effect of delay factor is also important to understand the consequences and outcome that arising from delay caused. According to Rahsid et al. (2013) the utmost serious problem from the delay in construction industries is either cost or time overrun in construction project as several researchers have studied. For example, Ramabodu&Vester (2010) suggested that the time and cost overrun is a critical effect from delay problem in construction project that occurring from change orders in scope of working on site, incompleteness of design during the tender, contractual claims and delay in costing modification and additional works in the project. Similarly, Chileshe&Berko (2010) demonstrated that the causes of cost overrun in Ghana construction sector are delay in payment between owners and contractors; variations; inflationary cycle and the postponement in time schedule. Moreover, the effects of delays and disruptions have been released from other scholars, for instance, a study by Aibinu&Jagboro (2002) exposed that six major effects of delay process in Nigerian construction industry as: time overrun, cost overrun, dispute, arbitration, abandonment and litigation. As well as the study in Malaysia, Sambasivan& Soon (2007) revealed the same six effects with Aibinu&Jagboro (2002) studied in Malaysian construction industry.

Hence, all of these impacts are critical damage that caused from the delay and disruption in construction project. However, overall of delay in construction project can occur by several factors by either owner's responsibility or contractor's responsibility. As a consequence, the overlapping nature of delay effect has a difference influence to each party involved in the construction project even though the usual problem is time and cost exorbitant (Arditi&Gurdamar, 1985). From the owner point of view, the effect of delay means the loss of income owing to incomplete production or inconvenient of service facilities, for example, if the skyscraper is affected delay so that the client would continuously lack reliance in the project, and therefore, the owners will lose profitable on the present facilities. From the contractor's perspective, the effect of delay means the loss continuous to pay for equipment and the person hired on daily wages over the contract. Additionally, the contractors might lose the confidence from the owners and the other projects cannot be pursued as well.

According to above previous studies, therefore, the delays have a huge effect on each party who participate in construction project, especially in high-rise building projects. In this research, the main problem of delay will be categorized in to six related factors in order to identify the actual delay and impact of delay that related to high-rise building project in Bangkok.

IV. Methodology

In order to identify the delay factors in high-rise building projects, thus, research design is a necessary part which is organized to plan the data gathering not only to answer the research questions, but also can guide into an accomplishment of research objectives as some scholars have mentioned (Davis, 2005; Kothari, 2005). For instance, Kothari (2005) noted that Research design is the conceptual structure within which research would be conducted; Burns & Grove (1987) also argued that the research design is a plenary strategy for the study to identify the problems and preparing the plans for gathering

the correct data. Therefore, it can seem that the research design is the first steps to set up the plan for inquire the data with qualitative, quantitative and mixed method approaches that provide the specific direction into the procedure in a research design.

As previously stated, this research is designed to describe the previous studies in order to explain what necessary causes and effects of delay factors in construction industries. Moreover, the gathering data will be used both of interview and survey methods to complete the results that show the occurred delay in Thai construction project, especially in high-rise building projects. As a result, due to the sample of this research is relatively small (i.e. whether owners, consultants and contractors), the data will be analyzed by the relative importance index (RII) method in order to calculate the frequency and ranking each critical delay within related six delay factors as (owner, consultant, contractor, material, labor and external factor).

Survey

The survey is an essential type of the research tool because it can justify and assess the incident and opinion as well as to describe the study fairly and accurately. The survey research design is often used because of the low cost and easy accessible the information (Shuttleworth, 2008). As a consequence, researcher can design the survey method to approach the hypothesis and objective of the research in order to evaluate and develop the measurement scales. Due to the questioning and prospects depend on the researcher's intention; therefore, the variables in the survey such as sample size, data gathering method, data analysis are the main concern of the survey, by the way, researcher can determine all factors survey that can be generalized to the entire population of interest via interview and questionnaire. In this research, the questionnaire and interview are used to conduct the data on project-site directly. This method ensures that all of respondents have an experience in the major construction project indeed. To supporting this method, several researchers have used this method to gather the data and also have generated the reliable of results.

Interview process

The interview method is used in this research in order to collect the in-depth data in terms of qualitative method. According to Burgess (1982) the in-depth interview is one of the most efficient methods for gathering the data by discussing with the people who have an experience or expert in order to apprehend their point of view. Ritchie & Lewis (2003, P) argued that the five key features of the in-depth interview practice as "intention the structure interview with flexibility, interactive in nature, using techniques to achieve answer in terms of penetration, exploration and explanation, originated in the sense of new knowledge or thoughts about the interview's topic and the emphasis of the natural form such as in-depth information, nuance and the interviewee's own language".

In this research, the in-depth interview data has received the cooperation from the project manager and consultants who have an experience several years and working directly on high-rise building project. The interview is focused on the major causes and effects of delay problems in Thai building construction projects in order to obtain the accurate and relevant information for the main condition of delay issues. According to Gill et al. (2008) "there are three main fundamental types of the research interviews as structured, semi-structured and unstructured". In this research, the interview used both of unstructured and semi-structured interview methods by face to face conversation around one hour. As a consequence, the purpose of the research interview is to sight the main issues of delay caused and how that influenced in Thai skyscraper projects. Due to the interview is an appropriate method to gain intensely understanding and awareness for the research problems (Gill et al., 2008) from interviewees who have an expert knowledge, experience and understanding that relevant about the delay in construction project management.

Questionnaire surveys

This research is a description of the questionnaire; thus, it is used to accumulate the quantitative data. Marsh (1982) argued that the quantitative survey is a

good technique to provide and demonstration that are “adequate at the level of meaning”. The query is applied how to collect data from a well-defined sample, by the way, it contains of a series of related questions to the research objective in order to be analyzed by using the descriptive statistics. The main purpose of questionnaire survey is to examine the several issues that relating within the delay problems in Thai construction project by the perspective of respondents who participated in site-working such as project owners, consultants, contractors, engineers, architecture from 51 respondents. Definitely, the questionnaire is designed an emphasis based on literature review, previous studies and academic journals in order to obtain the key data of delay topic to design a suitable data within Thai construction delay problems. By the way, the questionnaire was consisted of three main segments.

First of all, the first section is asked about the background of respondents such as working experiences, position in the organization, role and capability of the respondents in construction project and scope of their tasks. The objective of this section is for categorizing the group of sample sizes as the different groups in order to demonstrate the different views from the characteristic of respondents.

The second part of questionnaire is designed to identify the delay causes from the experience and attitude of respondents in order to show that survey results comprised the demographic information. The respondents were questioned to show their respond of the major delay caused in Thai building projects. By the way, the delay causes were categories into six main groups as:

- Owner related
- Consultant related
- Contractor related
- Material related
- Labor related
- External factor related

At that point, the respondents were chosen the rate of degree of severity in the delay factor in Bangkok through the close-ended question by a five point

Likert scale ranging from (1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = somewhat important, 5 = extremely important) to rank the crucial of delay caused in high-rise building in Bangkok.

The third segment of questionnaire is designed to gather the most important effect of the delay problems in high-rise building projects in Bangkok. The data were based on literature review and relevant academic journals to identify what impact that most influenced in Thai construction project. The respondents were asked to show their opinion which factors are the most potential impact, as well as describing why those factors were momentous. Incidentally, the Likert scale ranging is also used in this section for ranking with the highest of important impact of delay factor in Thai construction projects. As a consequence, the results could show the level of influence of delay caused. The result could be useful to help the researchers understanding what the main effects are, in order to find the solving problems how to prevent that impact could be happening in Thai high-rise building projects.

Data collection

There are a numerous implement to gather the sources of primary data such as in-depth interview, questionnaire survey, observation, case study and secondary data (Aliaga& Gunderson, 2005). The primary data in this research was launched by in-depth interview and questionnaire survey from site-working construction projects in Bangkok. The in-depth interview was concentrated on the experts who have participated in Thai construction industry in order to obtain the precise information that appropriately in the scope of delay factors in Thai building projects. It seeks to answer the research questions about why the delay factors that occurred and how they behave in the way to achieve that they do. Further, it also provides in-depth information about their behavior.

At the same time, the quantitative research as questionnaire survey was used to collect standardized information widely range data from a number of respondents, meanwhile, the interview

was focused containing only a small of sample (Aliaga& Gunderson, 2005). The questionnaire survey is a useful method to gather a numerous of respondents who have an opinion, view and attitude in terms of causes and effect of the delay in order to optimize the primary data of this research. In this research, the questionnaire is designed by the closed-end question, therefore, the results could be showed that the highest ranking of delay by the rationalization of their opinion. According Kometa et al. (1994) to the questionnaire survey have indicated the significant results in different types of research principally in the used of closed-ended questions. One of the main advantages of using questionnaire method is that it permits the researcher to gain their results relatively faster (Rowley, 2014). However, there is another way to collect the data from questionnaire that is open question but it is not suitable for this research because of the limitation of time to answer the questionnaire and the answer are also many variables from different respondent's view, which is more complex in analysing data. Thereby, after the questionnaire was finished, the results were analysed by using Relative Importance Index (RII) statistic measure for ranking the attributes in term of critically as perceived by the respondents.

Data analysis

As previously stated, the data management and analysis was executed by using Relative Importance Index (RII) statistic (Johnson &Lebreton, 2004) to determine the relative importance of the diverse causes and effects of delay in this research. This method is suitably to ascertain the importance of attributes of various causes and effects of delay as several scholars have mentioned. For example, Kometa et al. (1994) used the RII method to determine the relative importance indices of the various causes and effects within the delay issue; Kometa et al. (1994) also applied RII to investigate the important causes of delay from various groups (i.e. owners, consultants or contractors) in Indian construction context. Therefore, the RII method was chosen in this research due to RII is suitable method

to indicate the importance indices of various groups as classified to six main related causes of delay accordingly to relevant academic journals.

Incidentally, the Relative Importance Index was also adopted in this research for analysis of the data gathering from the current questionnaire survey, with in the various groups as categorized according to the role of project participants in Thai construction industry (i.e. owners, consultants, contractors, designer/architecture, and project engineer), as well as according to the delay related factor categorized (i.e. owner related, consultant related, contractor related, material related, labor related and external factors) and the potential effect of delay factor that occurred in Thai high-rise building projects. The five-point Likert scale was used to ranking the importance point from 1 (not importance) to 5 (extremely importance) of the delay and effect factors. The relative importance index (RII) is evaluated as follows:

$$RII = \frac{\sum W}{A * N}$$

Where W = weighting given to each factor by the respondents (ranging from 1 to 5), while A is the highest weight (5 in this research) and N is the total number of respondents in this research.

Basically, the RII was transformed the relative importance indices of each delay and effect factors, to define the rank of different causes which is essential of respectively factors as perceived by the respondents. In addition, the perspectives are arranged upwards order of ranks, which attributes with the highest of RII ranging indicated that the most causes and impact on the delay, while the attribute lowest rank indicated that it has the least impact during delay in Thai construction projects. As a result, the results of RII statistic will be compared with the interviewee's perspective in order to identify the actual causes and effects on the delay problems in high-rise building projects in Bangkok.

V. Results and Discussions

According to Relative Importance Index analyzing

from the table above, the result shows that seven most importance delay factors more than 80% are change orders, financial problem of contractor, slow decision-making, shortage of labors, improper planning from contractor, lack of good communication between each party and third party delay such as sub-contractor or supplier. Based on ranking, the results indicated that the highest critical of construction delay as perceived by owner related were; (1) change orders with RII=0.86 followed by; (2) the slow decision-making with RII=0.84; (3) unclear with shop-drawing design with RII=0.78; (4) late payment by owner with RII=0.77.

Meanwhile, the most importance causes of construction delay as recognized by consultant related were; (1) delay in approving major changes with RII=0.77; (2) preparation and approving of drawing with RII=0.76 and (3) lack of knowledge and expertise by consultant with RII=0.72.

Simultaneously, the most crucial causes of construction delay as realized by contractor were; (1) financial problem of contractor with RII=0.85 followed by; (2) improper planning with RII=0.83; (3) lack of good communication with RII=0.82 and (4) third party delay such as sub-contractor or supplier with RII=0.80.

Even though the three common relationships as owner, consultant and contractor were the significant roles of delay caused in Thai construction projects, however, there were other issues that also influenced the delay within respondent's perspective as; shortage of labors with RII=0.84, shortage of constructive materials with RII=0.78, transportation, traffic jam and restriction with RII=0.73 and both of change in specification materials during the construction and delay in manufacturing of special materials with the equal frequency with RII=0.72.

On the other hand, the results represented that there were 14 causes not the necessary factors within the Thai construction, which frequency lower than 0.70 percentages were; negotiate contractual; contract management; improper site management, international labor problems such as communication and legal; location of site working; delay in

performing final inspection and certification by a third party; late in review and approving design documents by consultant; poor communication Between consultant and other parties; delay in procurement of supplier's materials and delivery; weather hot, rain, etc; effect of social and culture in company/organization or working with other parties; change in government regulations; unqualified workforce such as dispute or strike and damaged in ordered materials

From the above list, the results show that the highest frequency scores originated from the owner related factor following by the contractor related factor. Nevertheless, it seems that the external factors show lowest frequency score what is impacted in Thai skyscraper construction projects. Thus, it is interesting to compare the causes of delay as acknowledged from the questionnaire survey with the interview process in order to investigate the truly major causes of delay in Thai high-rise building projects. What is more, the problems of delay will affect severity impact trough the project expectation.

Based on ranking, surprisingly, the highest ranking of effect in construction delay as received by respondents was delay in obtaining the funds and profits either owner or contractor with RII=0.94. Furthermore, this is closely followed by the cost overrun having RII=0.90, and then time overrun having the RII value of 0.88. According to the table above, time is really crucial impact in every phase of construction factor and also increase in the final cost; it means that more money has to be spent. Hence, it can seem that losing the personal benefits of both owner and contractor is the most essential effect within the delay issue in construction project in Bangkok. Undeniably, the investor wants the funding and business profits to turnover as soon as possible, therefore, if the task is under delay that they cannot gain the money back and the effect of delay also affects time and as the adage goes time is money (James et al., 2014). Besides, the table4 show the medium results that affecting in Thai construction project respectively as; low quality of work due to hurry with RII=0.77, arbitration having

RII value =0.75, disputes value of RII=0.73 equal frequency with negative social impact from neighbor. On the other hand, the severe effect as project abandonment was ranked the least with only RII=0.69. Further, the lowest rank was not a key effect in Thai construction was idling resources with RII value 0.62

Consequently, these results from questionnaire survey either causes of delay or effect of delay are necessary to answer the two main research questions in this research. Moreover, it can stimulate the researcher on the subject in various parts within the subject of delay and effect in differ countries. Through limited of sample size, this study attempts to establish the status quo on the delay subject in Bangkok which could form a base for comparison with other parts of the world.

Results from interview process.

From the observation, the first interviewee who posited a project manager of The Noble Ploenchit project, who has an experience more than 10 years within high-rise building industry, besides, he positions of project manager in Bouygues-Thai what is a global company in construction industry. This project is built as a luxury condominium which located at the centre of Bangkok. The construction contract has the valuable approximately 4.5 Thai Billion Baths (approximately £100 million) by the contract period is 43 months (DDproperty Content Team, 2015). From his point of view, the critical delays are shortage labor, delay in procurement and design changes. Although, there are some situations that can be occurred the delay such as natural disaster (flooding) and strike worker, however, these factors are unforeseen circumstances so that could be happened without predictable in construction projects according to interviewee's perspective. In order to obtain and deeply understand more information, the interview is designed to focus the three main related factors as owner, consultant and contractor within interviewee's vision. The results show that the major delay is unclear in both process of tendering and shop drawing and slow decision-making in term of approving design and

specification of materials. It means that the owner's decision has the huge influence when the project has begun, thus the details should be finalized as soon as possible not only from the start but also does not change orders during the project implementation. Similarly, the main problem from the consultant is an approval within design and shop drawing. Due to the consultant plays a key role in the endorsement of the design and requirement, consequently, the decision-making of consultant is an essential determinant of delay as well as the project owner.

VI. Conclusion

There are two main research questions to achieve the aims and objectives in this research. In order to answer the first research question, the most prominence is that owner relation has a potential impact to occur the delay problems to Thai construction project performance. The change orders and slow decision-making from owner are appeared the most significant delay from analyzing RII result and interviewee's perspective. Nevertheless, the main contractors also play a key role with the delay issues whether financial problem, shortage labor and improper planning. Therefore, in answer the first question, it is clear that the major causes of delay in Thai construction project are indeed related between project owner and contractor which show the level of essential delay in Thai construction performance. By the way, the consultants have less level to contribute the delay factor agreeable to RII results. It can be seem that the role of consultant that related some factor with the delay problem such as approving process of design or documentation, however, the key role of this sector will mostly be the duty of the owner. That is the reason why consultant has less level of delaying of Thai construction in this research.

In order to answer the research question two, "delay in obtaining fund and profit" has the highest ranking potential impact from Thai construction project and following with time overrun and cost overrun. It can be seen that these three effects are the critical factor which could occur from change orders in scope of worked, financial problem, indecisive of

decision-making and not readiness of labors and facilities. All of these delay factors have an utmost influence to time overrun as well as cost overrun when the working time is over the contract. These factors, therefore, can be said that the source of main reason is to obtain slowly returns of funds and profits for owner and main contractor. Moreover, if the project cannot be completed due to the protracted of delay issue, the ultimate serious effect maybe arise the disputes, arbitration and project abandonment. However, according to Table4 below, these serious effects are not often occurrence in high-rise building project in Bangkok which is showed the low important index from respondent's experience. The reason is that if the project is delayed, the contractor must be found the reason why the project has the delay issue and discuss to the authority in order to identify the solution what can be acceptable for each party.

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