

The Performance of Disbursement Procedure of Public Works in Thailand

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Abstract—This paper analysis performance of disbursement procedure of public works project in Thailand. The results of research were summarised based on contracts, submitted invoice, inspection dated, copies of disbursement dated between client and their main contractor and interviewed with persons involved in central and local government projects during 1994-2008 in Thailand. The data collection was to investigate the disbursement procedure related to performance in disbursement during construction period (Planned duration of contract against Actual execution date in each month). A graphical presentation of a duration analysis of the projects illustrated significant disbursement formation in each project. It was established that the shortage of staff, the financial stability of clients, bureaucratic, method of disbursement and economics situation has play major role on performance of disbursement to their main contractors.

Keywords—Construction disbursement, Payment procedure, Public works

I. INTRODUCTION

VULNERABILITY of organizational can be observed from the several indication factors. One of significant factor is time in delaying disbursement to their debtors. The delaying in disbursement factor indicates the possibility of organization in facing cash flow problems. In construction project, works can only be progressed and done by client of the project executes the payment to main contractor accordingly to contract agreement. Otherwise, main contractors tend to stick to a “play safe” policy in a chronically uncertain environment by keeping the minimum number of permanent employees on their payrolls, prolong their payment due if it is possible without any penalty from nominated subcontractor, subcontractor, employees or construction suppliers [1-3]. The factors contributing to construction suppliers’ default were identified as monopolised the market by small group of suppliers, work stoppages in factories manufacturing materials, fluctuating demands forcing suppliers to wait for accumulation of orders and difficulties in importing required new materials from other countries [4-5]. Governmental regulations factor

exasperates banking inefficiencies and cause disbursement delays manifested themselves in the form of delays in the release of foreign currency required for importing materials and equipments, delays in customs clearance and bureaucratic procedures [6]. Furthermore, traditional construction contract has also play a momentum impact on delaying disbursement process [7-8] as it governs both procedure and duration of each activity is needed in order to assessing the structures or making payment after quantity surveyor has verified the work. The work is paid after the work has been done, usually by installments as agreed amount of progress, rather than in advance. The consequence of delaying the disbursement is that the whole industry is economically affected by any drying up of the cascade of payments downward from the top of the pyramid. It is all too easy for client with cash flow problems to try to help his situation by delaying payments to the main contractor who then finds it difficult to pay his subcontractors who cannot, as a domino effect, pay to sub-subcontractors and soon go down the chain. It is possible to be considered as the main contractor is paid promptly from client but he does slow in paying to his subcontractors. Elazouni and Metwally [9] suggest that ‘subcontracting is a practice that main contractors rely on to partially finance projects’. The funds generated from operations are potentially far greater than the value of the organization managing them. This gives the contracting organization significant opportunities, but leads also to significant risk for the system.

II. LITERATURE REVIEWS

The delay in construction project has caused the impact to performance of overall construction project. Several researchers tried to find the causes and factors which influence the performance of construction works. Arditi, Akan and Gurdamar [10] investigated the reasons for delay in public projects in Turkey, they found and categorised important reasons for construction delays into 4 main groups: shortage of resources, financial difficulties, organizational deficiencies and frequent change orders. While, Assaf and Al-khali [11] pointed out the main causes of delay in large building projects and their relative important. They found that the most important delay factors were preparation and approval of shop drawings, delays in contractor’s progress, payment by owners and design changes. In the aspect view of architects and engineers were cash problems during construction, the

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relationship between subcontractors and the slow decision making process of the owner. While the owner's points of view agree on that design errors, labour shortages and inadequate labour skills are important delay factors. Hancher and Wowings [12], provided a great information on methodologies used by transportation agencies to establish the contract duration used for highway construction projects, and also provide a schedule guide for field engineers during construction. Similarly, Chalabi and Camp [13] conducted a review on project delays in developing countries during planning and construction stages. In their study, they found the delay and cost overruns of construction projects were dependent entirely on the very early stages of the project. From literature review of recent research has also pronounced many factors which found to affect construction time performance. Nkado [14] demonstrated the prioritization of construction-time-influencing factors that could be incorporated in an information system, which could then help in planning project durations. He used 12 scope-related variables, such as gross floor area, to develop model. Similar, Naoum and Mustapha [15] investigated the relationship between the building team, procurement method and project performance, the result could not be concluded to support evidence to confirm the claim that alternative procurement methods shorten construction times. Parallels could thus be drawn with the work of Walker [16-17] in Australia which revealed that contract types did not affect the speed of construction and that several client-related factors proved more significant, particularly as to how well the clients or their representatives relate to the project team. He also found four factors which affected construction performances and best practice were construction management effectiveness, the sophistication of the client and the client's representative in terms of creating and maintaining positive project team relationship, design team effectiveness in communication with construction management and client's representative teams and a small number of factors describing project scope and complexity. Therefore, a review of the literature regarding the characteristics of procurement in construction is conducted. This information was then summarized in relation to the objective of this study. The objective of this research is to determine the performance of actual disbursement against schedule payment of public projects and to aid construction managers in establishing adequate evaluation prior to the contract award using quantitative data. The key task was to design research so that the information obtained permits the assessment of their impact. Therefore, the best approach to assessing these potentials was to adopt randomly selected samples. The sampling population was established by selecting 126 public projects. The data was found in contract agreement between central, local government agencies and main contractor. This research projects upon results obtained from a pilot study undertaken on investigating key elements that contribute to the level of success or failure payment system in linkage between client and main contractor for those domestic and international construction companies engaged with the provision of construction infrastructure projects in Thailand (Thai). The research involved interviewing key project managers, senior managers, vice presidents, owner,

government officers, site engineers, quantity surveyors and accountants responsible for these large projects. All of the companies involved are engaged in individual projects exceeding US\$20-250 million in construction cost. These respondents represented French, Japanese, and Thai contracting companies. This paper aims to add to the body of knowledge of performance in disbursement through providing valuable insights from very senior level executives in these organisations. It is often very difficult to gain access for in-depth discussion with such individuals.

III. RESEARCH METHODOLOGY

This approach mainly concerns with the examination of statistical data of domestic construction markets from both domestic and international main contractors in Thailand. There were two main data sources in this approach namely: original and residual. The original data consists of original documents or official files and records, such as government book keeping record for disbursement and construction company's record books. The original data consisted mainly of the calculated or justified data which was derived personally. The original data is used in order to find the number of days used in disbursement procedure. The disbursement procedure is divided into three stages. It is based on FIDIC recommendation for disbursement procedure [18-19]. First activity is submission invoice, Second stage is inspection and issued the certificate of inspection and Third stage is payment to main contractor. The number of days used in each stage is defined as the number of days allowed to complete in each activity which is written in contract agreement subtract with the number of days counted as day one of working day in that stage and subtract with the sum of the number of days of weekend, unforeseen events which cease work progress and holidays. The residual data consists mainly of interviewed with person involved in each activity of each stage of disbursement procedure. The residual data will be conducted after the original data have been completed and tabulated into graphical data. It is used as an evident record during interview. The residual data provides factors or reasons which the performance of each activity in the disbursement procedure is performed. The archival research method is mostly applied approach in this research, as it enables to access to a vast quantity of data from the already widely accepted publications. If there is a difficulty in collecting original data, the residual method was used in the analysis. However, the collection of such types of data suffers from the biases existing in the original data. The greatest difficulty in this research is the possibility acquires the contract agreement as well as the actual dated of each activity in payment procedure.

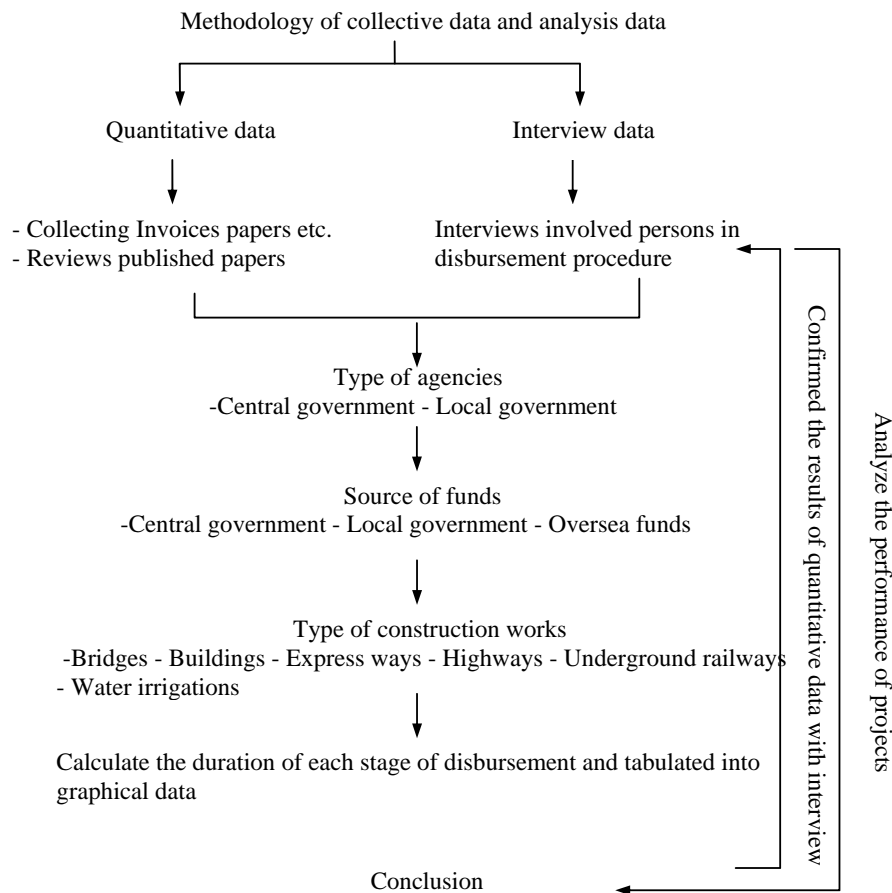


Fig.1 Methodology of collecting and analysis data

IV. FINDING AND DISCUSSION

A The performance of disbursement

Information on the type of clients, financial sources and type of construction works and the performance of each construction works are shown in figure 2 and tables I, II, III and IV respectively. Table IV represents the summary of client's performance. The number indicates an average number of days used in each stage of payment process. The result in table 4 is calculated by the subtracting the number of days written in the contract agreement from the actual number of days used in disbursement process. In each stages of activity, the performance is calculated by following the designed method. The designed method is divided into three stages. The first stage is the submission of invoice from main contractor to client or client's representative when fully requested invoices from main contractor has been approved and verified according to client requirement. Second stages are inspection and issued the certificate of inspection. It is counted as quantity surveyor/engineers inspection has approved on amount of work which has been done and the certificate has been issued to main contractor. Third stage is

payment. It is counted as number of day used in exercise subtracted with agreed payment due date. These are three stages which have been implemented in this research. It has been found from table 4 that the number of days used in submission of invoice stage of central, local government and oversea funded projects are varied between -1 and +2 days. Whereas, the number of days used in the inspection and issued the certificate of inspection and the payment stage are fluctuated.

It has been further found that the building works with oversea funded projects is the most time spent in inspection and issued the certificate of inspection stage. While bridges and highways works with oversea funded projects are the least time consumed in inspection and issued the certificate of inspection stage. As far as the payment stage is concerned, the building works with oversea funded project is the most construction work consumed time in executing payment. While expressways works is the least construction work time consumed in making payment stage when it is compared with contract agreement. Therefore, in the overall performance of disbursement, the expressways works with JBIC funded projects comes in the first of least time consumed in disbursement process, the highways works with IBRD

funded, Bridge works with JBIC funded came in the second and third place respectively. On another hand, the building works with JBIC funded projects comes in the first place for the most time consumed in disbursement process and followed by water works with JBIC funded and Building works with central government funded.

TABLE I
SUMMARY OF TYPE OF CLIENTS

Classification	Number of projects
Central-government	115
Local-government	11
Total	126

TABLE II
PROFILES OF FINANCIAL SOURCE

Classification	Number of projects
ADB ¹	10
IBRD ²	3
JBIC ³	55
Central	47
Local	11
Total	126

Note :

¹ = Asian Development Bank

² = International Bank for Reconstruction and Development

³ = Japan Bank for International Cooperation

TABLE III
TYPE OF CONSTRUCTION WORKS

Classification	Number of projects
Bridges	13
Buildings	22
Express way	18
Highways	48
Underground railways	12
Water irrigations	13
Total	126

TABLE IV
PERFORMANCE OF PUBLIC WORKS PROJECT (DAYS)

Type of works		Submit (days)	Inspect (days)	Payment (days)	Sum (days)
Bridges	JBIC	+1	-5	-9	-13
	Central	0	+3	-8	-5
Buildings	JBIC	+2	+73	+39	+114
	Central	+1	+6	+14	+21
	Local	0	+4	+12	+16
Expressways	JBIC	-2	-3	-48	-53
Highways	ADB	-1	-4	+3	+2
	IBRD	-1	-5	-28	-34
	JBIC	-2	-4	+2	-4
	Central	+1	-4	+4	+1
Underground railway	JBIC	-1	-4	-13	-18
	Local	0	-3	0	-3
Waters irrigation	JBIC	+2	+6	+23	+31
	Central	0	+3	+8	+11

Note: (-) = under due date, (+) = overdue date

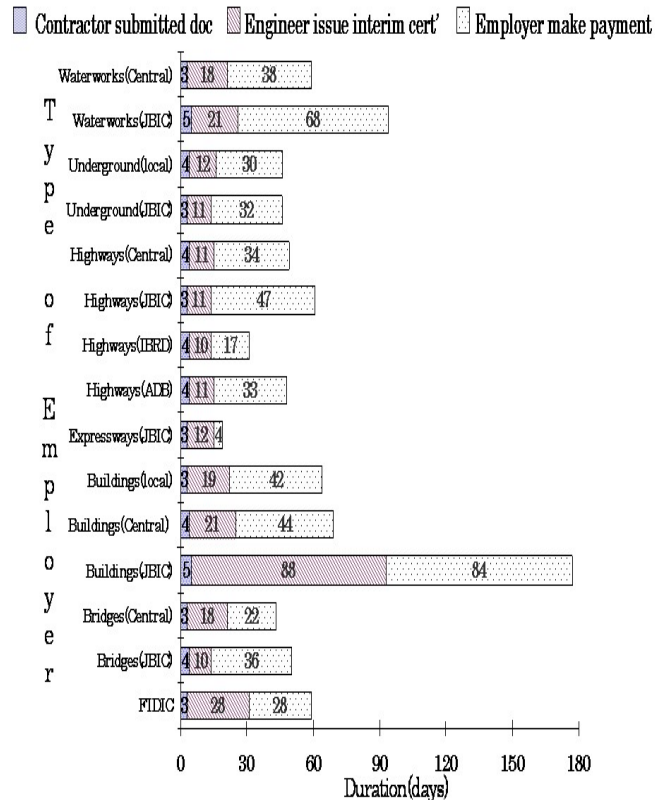


Fig. 2 Summary of duration in disbursement process of public works

B. Pattern of disbursement

The disbursement of each month of each project is calculated and plotted into graphical data. It has been found from result (figure 2-8) that the overall performance of disbursement in construction works can be generalized in 4 major patterns. **First pattern** is a moderate straight line with few jumping points. Each month of these first pattern projects obtain the number of delayed days in disbursement process lesser 30 days than contract agreement. It has seen as general patterns of construction work with few obstructions. **Second pattern** is gradually increasing with time and have few jumping points. The projects obtain incidents which cause the number of delayed days in disbursement process in each month lesser 60 days when it is compared with contract agreement. This pattern has similarity to pattern one but the degree of seriousness is higher than the first pattern. It can be noticed from graphical results (figure 3-8) that pattern two have few higher in amplitude points and more often to occur. **Third pattern** is frustrated line. The project obtains the incidents which cause the number of delayed days in disbursement process in each month lesser 120 days than contract agreement. This pattern represents the highest sensitivities of factors. The degree of seriousness is the most severe in all three patterns which brings the point to a sudden

high amplitude level. *Fourth pattern* is gradually decreasing with time and have few jumping points. The number of delayed day in each month decrease as time moves toward the end of project. This pattern is an evident of improving of skill. The number of day used in disbursement procedure decreases with time. This is a result of improving skill and knowledge. The numbers of repeated mistakes were decreased. Nonetheless, having a few jumping points is caused by frustrated, unexpected event or problem which can not be compromised within a certain time. The summary of patterns of disbursement in construction works are shown in table VIII. The patterns of disbursement of public works are caused by these factors. It has been found from interview and questionnaire with persons involved in each stage of disbursement procedure. The factors which caused submission, inspection and issue the certificate and the payment stage delay are showed in table VI-VIII.

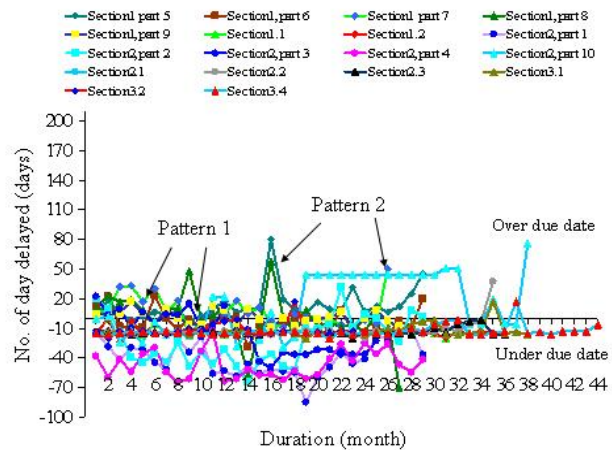


Fig. 5 Characteristic of expressways works with JBIC fund projects

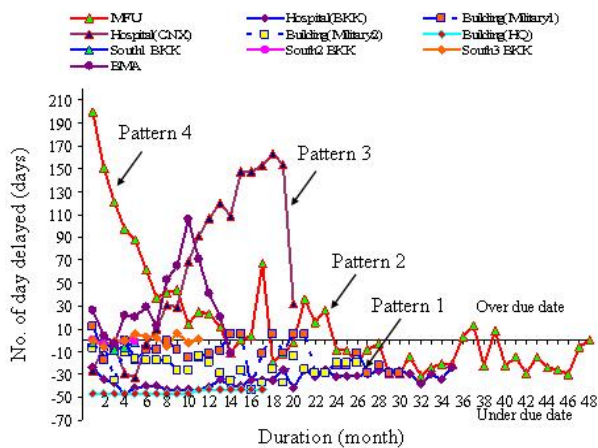


Fig. 3 Characteristic of building works with government fund projects

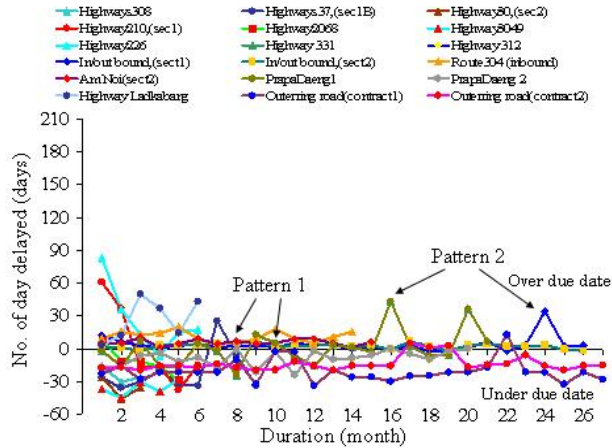


Fig. 6 Characteristic of highways works with Central government fund projects

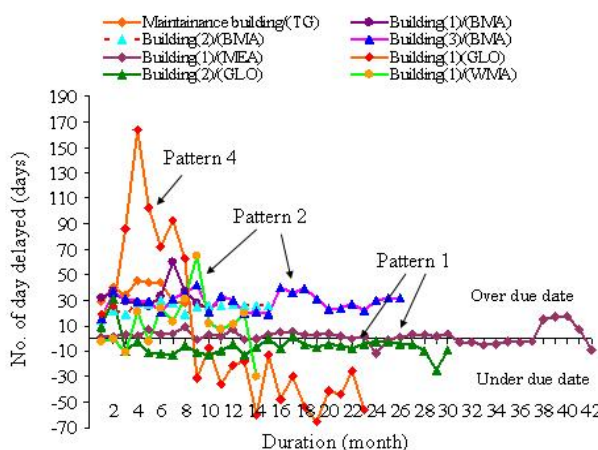


Fig. 4 Characteristic of building works with local government fund projects

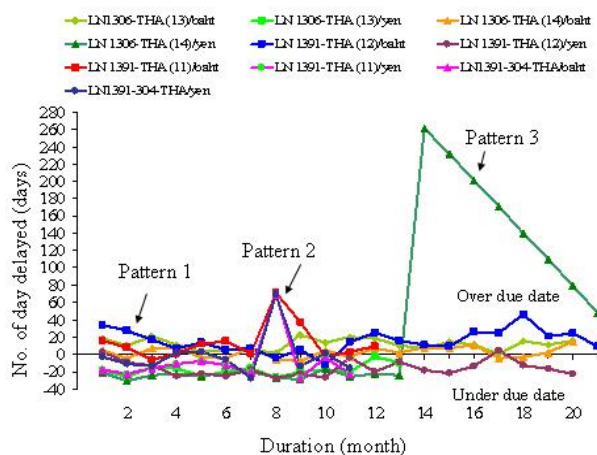


Fig. 7 Characteristic of highways works with ADB fund projects

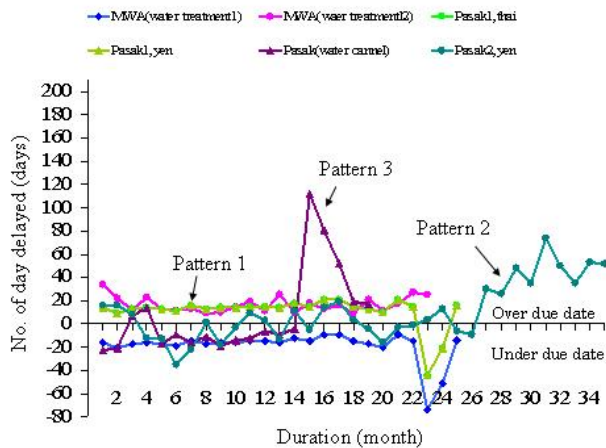


Fig. 8 Characteristic of water irrigation works with JBIC fund projects

TABLE V
SUMMARY OF PATTERNS IN CONSTRUCTION WORKS

Type of works		Pattern one	Pattern two	Pattern three	Pattern four
Bridges	JBIC	—	—	✓	—
	Central	—	—	✓	✓
Buildings	JBIC	—	✓	—	—
	Central	✓	✓	✓	✓
	Local	✓	✓	✓	✓
Expressways	JBIC	✓	✓	—	—
Highways	ADB	✓	✓	✓	—
	IBRD	✓	—	—	—
	JBIC	✓	✓	—	—
	Central	✓	✓	—	—
Underground railway	JBIC	✓	✓	—	—
	Local	✓	✓	—	—
Waters irrigation	JBIC	✓	✓	✓	—
	Central	✓	✓	✓	—

C. Influenced factors in disbursement process

Further study is conducted in order to find factors which reflect its performance. Interview and questionnaire has been implemented with persons involved in each stage of disbursement process in each project. The scale of degree of seriousness is 10-1. The most seriousness is scored as 10 and the least degree of seriousness which affected to disbursement performance is 1. The influenced factors of each stage are shown in table V-VII.

The first finding is financial conditions of main contractor. It also causes a decrease in their performance of disbursement of construction project. The financial of main contractor also plays an important effect on the number of days delay [20-21]. In other words, the financial of main contractor has affect on their performance as completed works can not be claimed. Unless, all completion of each work of each stage has been fully completed and submitted to client or client's representative. Therefore, main contractor faces cash flow problem and might not able to purchase for construction materials and pay for labour fee. These factors

cause the performance of work decreases. Interviewees agreed further on the size of construction firm have influence on the performance of progress work. Especially, a larger construction companies has advantage on rise the capital to alleviate the cash flow problem in shorter time than small-medium construction companies [22-23]. The second finding is source of funds. It is found that the performance of disbursement of each fund faces both delay and advance in payment schedule. This might be attributed to an efficiency of the staff involved in the payment procedure. It is difficult to maintain such a level of high performance. This might be a close link between disbursement procedure of each fund and working culture of each country. Nonetheless, there is no evident to analyze and conclude. The third finding is shortage of staff. This factor has been mentioned in each stage of disbursement process. Practitioners admitted the shortage of staff factor causes an overload to their staffs which affects their performance.

TABLE VI
SUMMARY OF DELAYED FACTORS IN SUBMISSION STAGE

Source of fund	Factors	Degree of seriousness
Government/Overseas	Financial of main contractor	10
	Shortage of staff	9
	Unfamiliar with overseas required documents	8
	Communication between main contractor and engineers and government agencies	7
	Main contractor competence	6
	Bureaucratic	5
	Change in works	4
	Traveling allowance	3
	Government acts	2
	Long holiday break	1

TABLE VII
SUMMARY OF DELAYED FACTORS IN INSPECTION AND ISSUED THE CERTIFICATE STAGE

Source of fund	Factors	Degree of seriousness
Government/Overseas	Shortage of staff	10
	Bureaucratic	10
	Adverse weather	9
	Insufficient equipments for testing and inspection	9
	Major accidents	8
	Communication with engineers and main contractor	8
	Delayed dispute resolution	8
	Defective design	7
	Site access/ right of way	7
	Change of work	6
	Act of god	5
	Unclear drawings	4
	Contractor competence	3
	Third party delays	2
	The relationship between overseas and local staff	1

TABLE VIII
SUMMARY OF DELAYED FACTORS IN PAYMENT STAGE

Source of fund	Factors	Degree of seriousness
Government/Overseas	Fiscal budget	10
	Shortage of staff	9
	Bureaucratic	8
	Financial crisis	7
	Bank policies	6
	Bank procedure	5
	Unfamiliar with overseas required documents	4
	Traveling allowance	3
	Change in works	2
	Communication with overseas agencies	1

D. Further Finding

The disbursement of procedure in Thailand has to comply with Bank of Thailand (BOT) rules and regulations which might not suitable and workable with overseas rules and regulations. Therefore, there might be difficulties in bringing the performance of disbursement as it is stated in contract agreement. Experiencing in disbursement procedure is also one of the important factors which has influenced on improving the performance of disbursement procedures. Nonetheless, the performance of disbursement of project should be kept as contract agreement is written. Therefore, this thought is a result of prevention in fearing of conspiracy and generosity theory from public thought and awareness.

V. CONCLUSIONS

The followings conclusions were partly based on "Study of Payment Procedures of Public Works in Thailand" Ph.D thesis.

A. Performance of disbursement

(1) The public works with overseas funded has lesser time consumed in disbursement process than central and local government funded projects.

(2) The performance of local-government funded projects are better than government funded projects in building work projects

(3) In measurement of disbursement performance of highway works. The conclusion is illusive.

(4) IBRD fund agency has less time consumed in overall disbursement practice than others overseas fund agencies.

(5) Payment stage has the most affect on total performance of disbursement process than inspection and issue the certificate and submission stage.

B. Pattern of disbursement

Pattern of disbursement can be categorized into 4 patterns

(1) First pattern is a moderate straight line with few jumping points. The projects obtain the incidents which cause the number of delayed days in disbursement process lesser 30 days than contract agreement in each month.

(2) Second pattern is gradually increasing with time and have few jumping points. The projects obtain incidents which cause the number of delayed days in disbursement process lesser 60 days than contract agreement in each month.

(3) Third pattern is frustrated line. The projects obtain incidents which cause the number of delayed days in disbursement process lesser 120 days than contract agreement in each month.

(4) Fourth pattern is gradually decreasing with time and have few jumping points. The number of delayed day decrease as time moves toward the end of project.

C. Influenced factors in disbursement performance

It has been found and concluded that:

(1) Financial of main contractor, shortage of staff and unfamiliar with overseas required documents are among highest factors concerned from practitioners in submission stage.

(2) Shortage of staff, bureaucratic and adverse weather are among highest factors which are concerned from persons involved in inspection and issued the certificate stage.

(3) Fiscal budget, shortage of staff and bureaucratic are among highest factors which are to be concerned from practitioners in payment stage.

ACKNOWLEDGMENT

This study was partly financially supported by Grant-in-Aid for Scientific Research No.18206048 from Ministry of Education, Culture, Sports, Science and Technology.

REFERENCES

- [1] D. Greenwood, "Subcontract procurement: Are relationship changing?" Construction Management and Economics., vol.19, 2000, pp.5-7
- [2] C. Gray. and R. Flanagan , "The changing role of specialist and trade contractors", Chartered Institute of Building, Ascot.
- [3] N.F. Mansfield, O.O Ugwu, T. Doran, "Causes of delay and cost of overruns in Nigerian construction projects. International Journal of Project Management., vol.12(4), pp. 254-260.
- [4] H.A Odeyinka, A. Yusuf, "The causes and effects of construction delays on completion cost of housing projects in Nigeria" Journal of Financial Management of Property and Construction., vol.2(3), 1997, pp.31-44.
- [5] Ayudhya Israngkura. B, Kunishima M, "Study of Payment Procedures of Public Works in Thailand" Proceeding of Annual Forum on Construction Management., vol.23, 2005, pp.147-150.
- [6] S. Love, 'Subcontractor partnering: I'll believe it when I see it' Journal of Management in Engineering., vol.13(5), 1997, pp. 29-31.
- [7] D.A. Bordoli, A.N. Balwin, "A methodology for assessing construction project delays" Construction Management and Economics., vol.16, 1998, pp.327-337.
- [8] D.W.M. Chan, and M.M. Kumaraswamy, "A comparative study of causes of time overrun in Hong Kong construction projects" International Journal of Project Management., vol.15(1), 1997, pp.55-63.

- [9] A.M. Elazouni and Metwally F.G, "Factor-based path analysis to support subcontractor management" International Journal of Project Management., vol.23(2), 2000, pp.109-120.
- [10] [D. Arditi, G.T. Akan and S. Gurdamar, "Reasons for delays in public projects in Turkey" Construction Management and Economics., vol.3, 1985, pp.171-181.
- [11] S.A. Assaf, M. Alkhalil and M. Al-Hazmi, "Cause of delay in large building construction projects" Journal of Management in Engineer, ASCE., vol.11(2), 1995, pp.45-50.
- [12] D.E. Hancher, J.E. Rowing, "Setting highway construction contract duration" Journal of the Construction Division, ASCE., vol.107(2), 1981, pp.169-79.
- [13] F.A Chalabi and D. Camp, "Causes of delay and overruns of construction projects in developing countries". CIB Proc, W-65; vol.2, 1984, pp.273-734.
- [14] R.N. Nkado, "A model for predicting and planning construction times at largely design stages" Proceedings of eleventh Annual ARCOM Conference, ARCOM., September, 2005, pp.298-307.
- [15] S.G. Naoum and F.H. Mustapha, "Relationship between the building team, procurement methods and project performance" Journal of Construction Procurement., vol.1(1), pp.38-49.
- [16] D.H.T. Walker, "An investigation into construction time performance" Construction Management and Economics.,vol.13(3), pp.263-74.
- [17] D.H.T. Walker, "The influence of client and project team relationship upon construction time performance". Journal of Construction Procurement., vol.1(1),pp. 4-20.
- [18] International Federation of Consulting Engineers (FIDIC)., Condition of contract (contract agreement), 2006.
- [19] International Federation of Consulting Engineers (FIDIC)., Conditions of contract (construction), 2006.
- [20] J.G. Perry JG and R.W. Hayes, "Risk and its management in construction projects" Proceedings of Institution of Civil Engineers., vol.78, 1985, pp. 499-521.
- [21] I.A. Khalil and A.A. Ghafly, "Delay in public utility projects in Saudi Arabia" International Journal of Project Management., vol.17(2), 1999, pp.101-106.
- [22] A.A. Aibinu and G. O. Jagboro, "The effects of construction delays on project delivery in Nigerian" International Journal of Project Management., vol.20, 2002, pp.593- 599.
- [23] Ayudhya Borvorn Israngkura, Ph.D "Study of Payment Procedures of Public Works in Thailand" thesis, University of Tokyo. 2006.