

# Causes of delay on highway construction projects in Thailand

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**Abstract.** Delay in construction project is an important issue in construction management. This is because delay will cause negative impacts on both the owner and the contractor. For owner, it will lead to the late opening of new road. For contractor, it will cause extra operating cost. In this paper, therefore, the causes of delay in road construction projects are researched. This paper studied a list of road construction delay causes gathered from literature having different countries. Internationally, twenty-six factors that might cause delays of road construction projects are identified in this research. Among 26 factors, considering in Thailand, eight key factors are typically found as the cause of delays in road construction projects. These 8 factors are then prioritized to identify the most important causes of delays in road construction projects in Thailand. A questionnaire and personal interviews through project engineer have formed the basis of this paper. The study indicates that the 5 top factors affecting road construction delays are: incomplete drawings, lack of equipment efficiency or financial status of contractors, delay in relocating existing infrastructure structures, less of project engineer experiences, and delay in relieving environmental impact, respectively

## 1. Introduction

### Background

Transportation infrastructure development is an important role to promoting the economic development of the country. Currently, the department of Highways develop highways' network development plan. This plan has objective to support national logistic networks, ensure the highway network to support ASEAN economic, and improve and maintain highway network throughout Thailand. Presently, the Department of Highways operate highways over 51,504 kilometres across all regions of Thailand, divided as 1,992 km of RC paved roads, 49,253 km of AC paved roads, and 258 km of non-paved roads. The travel patterns in Thailand are classified as: 89.60% by personal vehicle, 7.50% by bus, 1.80% by train, and 1.10% by airplane. From data in 2014, the main pattern of goods and products transportation is by land, about 81.20%. This information provides the necessity of high investment in road improvement and maintenance to provide the effective highway networks for support land transportation.

In highway construction, the delay in construction is one of the major problems that brought the department of highways concern. This caused the essential of research on construction delays in this study. The interest on finding causes of the highway construction delay can locate approaches to prevent or surround the delay problem. This research emphasizes on the analysis of

causes on highways construction delays. Therefore, the main objectives of this study are:

1. Study the causes of delay in highways construction projects in Thailand;
2. Prioritizing delay causes in highways construction projects in Thailand.

## 2. Literature Review

[1, 2, 3, 4] stated that construction period is the key factor to determine the construction expenses. The construction delay are important for contractors as it will cause extra expenses associated with the problems or delays and raise some unexpected damage costs.

There are a number of papers cited on delay causes in construction which can be summarized as the followings.

[2] The research in West Bank, Palestine, found that there are 52 delay causes in road construction project. The most important 5 factors are 1) political situation, 2) limited movement between area of west bank segmentation, 3) award project to lowest bid price, 4) progress payment delay by owner and 5) shortage of equipment that should consideration to improve project performance.

[3] Carried out the analysis of delay factor for Hospital Projects in Vietnam. Thirty-three have found and ranked in their study. The research reveals that the 5 top reasons of the delay in hospital projects in Vietnam are:

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financial difficulties to owner, supervisor's responsibility problem, owner design change, incompetence of contractor, and insufficient contractor experience.

[4] Performed the study on factors affecting schedule delay, cost overrun, and quality level in public construction projects. This study is based on a questionnaire with 26 factors which sent to the full population of publicly employed project managers. The analysis found the most influential factor for time is lack of project funding, for cost is error in consultant material, and for quality is construction work error.

[5] Examined the causes of construction delays on large scale construction project in Saudi Arabia. The research investigation based on data collected from project stakeholders, e.g. owner, construction company, construction consultant. The results indicated that there are 73 causes of construction delays which could be classified as 9 groups of causes. The research shows that change order is the prime reason of construction delay.

[6] The research found significant factors that causing delay in Malaysia building construction project. The study indicated that the prime cause of delay is financial problems and seconded by the lack of cooperation of stakeholder.

[7] The delay and cost overruns that studied in Vietnam construction focus on large projects. This paper examined the delay causes by employing a questionnaire survey from 87 experts from Vietnamese construction. The 21 delay causes and cost overruns was applied to categorize with Factor analysis technique and found the 7 yielded factors: i) Lack of Constraint and cumbersome, ii) incapable, iii) Design, iv) Market state and Estimate, v) Financial Capability, vi) Government, vii) Labor or Worker

[8] The research in Benin, the study focus on the delay factors which affect in construction completion. The 35 factors were identified and used to make the questionnaires and sent to the respondent like construction managers, contractor, owner, consultant and architects. The outcome show that the 10 most significant delay factors for example: contractor financial capability, financial difficulties from owner, subcontractor performance insufficiently.

[9] Stated that for the lights of enhancing highway construction proficiency in Thailand, the Department of highways performs the quality evaluation of highway construction work. From the review of this reports, the authors found that eight factors are the top most cause of construction delay are: i) incomplete drawing, ii) lack of equipment efficiency or financial status of contractors, iii) delay in relocating old infrastructure structures, iv) less of project engineer experiences, v) delay in relieving environmental impact, vi) lack of traffic safety during construction, vii) lack of training of management to monitor the construction operations, and viii) shortage of materials.

### 3. Research Methodology

#### 3.1 Review Causes of Delay

From the literature reviews, there are 26 causes of highway construction delay that are quite found in many researches as summarized in Table 1. The items are:

1. Difficulties on Financial
2. Material shortage on construction site
3. Poor construction site management
4. Mistakes and defective of work
5. Delay in delivery of materials on construction site
6. Problems on coordination with others
7. Site labour Shortage
8. Low productivity of labour
9. Poor skills and experience of labour
10. Lack of skill of subcontractor
11. Lack of contractor's staff on site
12. Shortage of equipment and tool on construction site
13. Inadequate planning and scheduling
14. Financial problem of owner
15. Slowness on making decisions
16. Contract modifications during construction
17. Lack of owner's coordination with contractor
18. Lack of material on the market
19. Poor construction site condition
20. Lack of equipment and tools on the market
21. Poor conditions of weather
22. Delays of Transportation
23. External work due to public agency
24. Poor conditions of economic
25. Laws and regulations change
26. Rise in price of the material

From these 26 major causes of delay, this research investigated the top rank reasons of delay based on data collected through the interview of highway construction management project manager from Bureau of Highways Construction, Department of Highways. The 8 major causes of highway construction delay are:

- i) Incomplete drawing,
- ii) Lack of equipment efficiency or financial status of contractors,
- iii) Delay in relocating existing utilities structures,
- iv) Less of project engineer experiences,
- v) Delay in relieving environmental impact,
- vi) Lack of traffic safety during construction,
- vii) Poor site management, and
- viii) Shortage of materials.



## 5. Discussion

The results from Table 3 indicated that the cause of delays in Thailand can be ranked by the severity of occurrence as followings.

- i) Incomplete drawing
- ii) Lack of equipment efficiency or financial status of contractors,
- iii) Delay in relocating existing utilities structures,
- iv) Less of project engineer experiences,
- v) Delay in relieving environmental impact,
- vi) Lack of traffic safety during construction,
- vii) Poor site management, and
- viii) Shortage of materials.

Furthermore, in this research, the comparison of causes of road construction delay between Thailand and international are performed. The 26 causes of construction delay from reviewing of various international literatures which were mentioned on section 3.1 are used as international causes of delay. The details of comparison describes on Table 4. It can be concluded that 4 causes of delay in Thailand are commonly found in International environment, namely 1. Difficulties on Financial, 2. External work due to public agency, 3. Poor site management and 4. Lack of material on the market. However, the results indicated that 4 reasons of construction delays are found only in Thailand environment, i.e. 1. Incomplete drawing, 2. Less of project engineer experiences, 3. Delay in relieving environmental impact, and 4. Lack of traffic safety during construction.

**Table 3.** Comparison of Causes of Delay

Item	Causes of Delay in Thailand	Cause of Delay in Literature Review (Section 3.1)
1	Incomplete drawing	-
2	Lack of equipment efficiency or financial status of contractors,	Item 1. Difficulties on Financial
3	Delay in relocating existing utilities structures	Item 23. External work due to public agency
4	Less of project engineer experiences	-
5	Delay in relieving environmental impact	-
6	Lack of traffic safety during construction	-
7	Poor site management	Item 3. Poor construction site management
8	Shortage of materials.	Item 18. Lack of material on the market

## 6. Conclusion

In this paper, the causes of delay in road construction projects are researched. A questionnaire and personal interviews through project engineer have formed the basis of this paper. The study reveals that the 5 top factors affecting road construction delays are:

1. Incomplete drawings,
2. Lack of equipment efficiency or financial status of contractors,
3. Delay in relocating existing utilities structures,
4. Less of project engineer experiences, and
5. Delay in relieving environmental impact, respectively.

The benefit of this study will educate project engineer the important of surrounding these delay factors to provide the completion of Highways construction project on time. However this study that has a population constraint then in the future work could be study in wider scope.

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