

REVIEW OF INFRASTRUCTURE PROJECT DELAY IN DEVELOPED AND DEVELOPING NATIONS

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1. INTRODUCTION

Infrastructure development projects around the World contributes to socio-economic development of nations. While planning and implementing projects, there arises different issues which leads to project delay and cost overrun. Due to involvement of many stakeholders and complexity of construction projects, time and cost overrun cannot be neutralized. It can be minimized with the proper assessment of delay risk factors which affect in smooth performance of project activities.

The effects of delays in construction projects are not confined to the construction industry but influence the overall economy of a country [1]. Delays in construction projects can lengthen schedule, increase in project cost and jeopardize quality and safety [2]. This finding agrees with that contractor working in developing economies work under special constraints which are not as serious in developed countries [3].

The objective of this paper is to review the critical infrastructure delay factors identified in developing and developed nations and finding the party which has more responsibility for delaying the project. It will help to understand the category of risk factors related to employer and contractor and their effect in overall project management in selected countries.

2. METHODOLOGY

2.1. Data collection

This research was performed based on the findings of previous research on Delays in construction projects: A review of causes, need & scope for further research [4]. Research on infrastructure project delay analysis using questionnaire survey was performed in different time domain by different researchers in Turkey, Nigeria, Thailand, Indonesia, Malaysia, Pakistan and India. Similar research was performed in United State of America, Canada, Singapore, Australia, Denmark, United Kingdom and Ireland. The findings of those research are taken as secondary data for this research purpose (Table 1).

2.2. Data Categorization

The top ranked five delay factors obtained from the previous studies [4], are categorized in accordance with the International Federation of Consulting Engineers (FIDIC) i.e., employer related, contractor related and others (beyond the control of parties) for performing further analysis through this research. In this research, each delay factor is considered equally important for improving the performance. In each category, number of delay factors divided by the total number of factors gives the ratio ranging from 0 to 1. Zero stands no factor in the category and one indicates all five delay factors in single category (Tables 2 and 3).

Table 1 Top five delay factors in developing and developed countries

Developing countries	
Turkey	1. Delay in design drawings approval 2. Deficiencies in planning and scheduling by the contractor 3. Delay in delivery of materials at site 4. Poor site supervision by the contractor 5. Inadequate experience of the contractor
Nigeria	1. Delay in monthly payment 2. Delay in design and drawings approval 3. Poor contract management by the Employer 4. Deficiencies in planning and scheduling by the contractor 5. Unrealistic project schedule by the contractor
Thailand	1. Delay in design drawings approval 2. Lack of experience of Employer 3. Inadequate experience of the contractor 4. Unrealistic project schedule of the contractor 5. Incompetence of supplier and subcontractor
Indonesia	1. Delay in Design & drawings approval 2. Slow decision-making process 3. Deficiencies in planning & scheduling by the contractor 4. Poor coordination, poor monitoring by the contractor 5. Inadequate experience of workforce
Malaysia	1. Delay in monthly payments 2. Poor supervision & site management by the contractor 3. Inadequate experience of the contractor 4. Incompetence of subcontractor & suppliers 5. Poor coordination, monitoring and control by the contractor
Pakistan	1. Delay in Design & drawings approval 2. Owner's financial constraints 3. Poor supervision, site management by the contractor 4. Inflation, interest rates, escalation, political instability, economy, law & order 5. Other external causes
India	1. Delay in Design & drawings approval 2. Change order 3. Contractor's financial difficulties 4. Delay delivery of materials 5. Other external causes
Developed countries	
USA	1. Delay in Design and Drawings approvals 2. Deficiencies in planning and scheduling 3. Changes in site conditions 4. External work due to public agencies 5. other external causes
Canada	1. Change order 2. Delay in site clearance/failure to provide construction site 3. Weather / Ground conditions
Singapore	1. Delay in monthly payments 2. Evaluation of completed works 3. Contractor's financial difficulties 4. Force Majeure 5. Weather / Ground conditions
Australia	1. Contractor's financial difficulties 2. Availability of laborers on site 3. Unrealistic project schedule of contractor 4. Weather / Ground conditions 5. Inadequately qualified work force / low skilled workforce
Denmark	1. Delay in monthly payments 2. Deficiencies in planning & scheduling by the contractor 3. Lack of identification of needs 4. Rework due to errors by the contractors 5. Approval from the Government
United Kingdom	1. Change order 2. Subcontractor & supplier incompetence 3. Weather / Ground conditions 4. Changes in site conditions 5. Inflation, interest rates, escalation, law and order
Ireland	1. Delay in monthly payments 2. Delay in approval of design and drawings 3. Slow decision-making process 4. Contractor's financial difficulties 5. External work due to public agencies

Keywords: Infrastructure projects, Delay, Developed & Developing nations, Capacity

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3. RESULTS AND DISCUSSION

From the data analysis, in developing nations, factor ratio in contractor category is found higher indicating more factors are related to contractor. Additionally, factor ratio in employer category is also high indicating more factors are related with employer. But, the factors ratio in other category having lower value implies lowest role in delay.

On the other hand, in developed nations, the higher factor ratio in other category indicates that exceptional events are highest contribution for delay. Lower factor ratio in contractor category indicates better performance of the contractor. Similarly, the lower value of factor ratio in employer category is also the measure of better performance of employer.

While analyzing the factor ratios, the developing nations Turkey and Malaysia suffered from the contractor related delay issues having factor ratio of 0.8 in the category of contractor. This indicates that out of 5 delay factors (Table 1) 4 are contractor related issues. But, in Nigeria the factor ratio 0.6 in employer side indicates majority of factors i.e., 3 lies in employer side responsible for causing delayed performance. Furthermore, in developed nations, Canada has no contractor related issues and Australia has no Employer related issues. On the other hand, Denmark has not any issues beyond the control of the contracting parties (Table 1).

Finally, while analyzing the average factor ratio, the developing nations having 0.54 indicates significant factors are related to contractor's management capacity followed by the employer's capacity having factor ratio 0.37 (Table 2). On the other hand, factor ratio of 0.36 in "other" category indicates major role of exceptional events for delayed performance of the project (Table 3).

4. CONCLUSION

Using the factor ratio in three headings gives the idea on delayed project execution in developing nations due to poor performance of contracting parties. Resource management, timely decision and financial arrangement are the key factors related to employer and contractor in developing nations. On the other hand, developed nations have far better contractor capacity for managing delay causing issues during the implementation of infrastructure projects. Although, performance of employer is very similar to developing nations.

In conclusion, the factor values in each category indicates level of impact in delay execution of projects. So the developing nations need to focus on improving the parties capacities for timely performance of projects. This research contributes highlighting the importance of parties' capacity for better performance of projects.

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Table 2 Delay factor ratio in developing countries

Countries	Factor category		
	Employer	Contractor	Other
Turkey	0.20	0.80	0.00
Nigeria	0.60	0.40	0.00
Thailand	0.40	0.60	0.00
Indonesia	0.40	0.60	0.00
Malaysia	0.20	0.80	0.00
Pakistan	0.40	0.20	0.40
India	0.40	0.40	0.20
Mean	0.37	0.54	0.09
Std. deviation	0.14	0.22	0.16
Coeff. variation	37.3%	41.2%	174.9%

Table 3 Delay factor ratio in developed countries

Countries	Factor category		
	Employer	Contractor	Other
USA	0.20	0.20	0.60
Canada	0.67	0.00	0.33
Singapore	0.40	0.20	0.40
Australia	0.00	0.60	0.40
Denmark	0.40	0.60	0.00
UK	0.20	0.20	0.60
Ireland	0.60	0.20	0.20
Mean	0.35	0.29	0.36
Std. deviation	0.24	0.23	0.21
Coeff. variation	67.5%	78.2%	59.4%