

## **An Investigation into the Delays in Road Projects in Bahrain**

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**ABSTRACT:** *This research investigated the delays in road projects in Bahrain. It studied frequency and severity of delay's causes, as well as frequency of delay's effects in such projects. Forty seven causes were identified and classified by responsibility into six groups. A field survey was conducted through a questionnaire including 36 contractors, 24 consultants and 84 engineers working at Ministry of Works (MOW). The researcher concluded that there are many causes of delay related to contractors such as the improper planning and scheduling. One of the major causes related to the owner, i.e. MOW is delay in decision making. The main problems related to consultants are due to lack of experience. Moreover, cost and time overruns were two of the most frequent effects of delay.*

**Keywords:** *delay causes, delay effects, road projects.*

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### **I. INTRODUCTION**

Any construction project success can be realized by achieving its objectives within the planned time, budget and level of quality. One of the major problems that face the construction projects in general and road projects in specific is being behind the schedule, i.e., delay in submission. Delay can be defined as postponing the project completion time due to predicted and unpredicted causes. Completion time is very essential in construction; because "Time is Money". In some cases, to the contractor, delay causes higher overhead costs because of longer construction period. As well as that, material costs may increase due to inflation. To the client, especially if he is investor, delay means losing profits that are planned to be earned after starting the investment on the scheduled time, i.e. lost opportunity [1].

Delays caused by the owner such as lateness in submitting drawings and specifications, frequent change orders, and incorrect/insufficient site information generate claims from both the main contractors and subcontractors which in many times entail lengthy court battles with huge financial repercussions. Delays caused by contractors can generally be attributed to inadequate managerial skills. Lack of planning and poor understanding of accounting and financial principles have led to many contractors' downfalls [2].

It is beneficial for the construction parties to recognize the project current situation and identify the delay causes at its' early stages. This will help them a lot to take the necessary precautions in order to minimize the effect of those causes when they occur.

The main objectives of this study can be summarized in the following points:

- To identify and rank the causes of delay based on their frequencies of occurrence and their severity in road projects in Bahrain.
- To identify and rank the effects of delay based on their frequencies of occurrence in road projects in Bahrain.
- To suggest some solutions that may minimize delays in road projects.

In the following sections the literature review will be presented first, where it includes related previous studies, followed by research methodology and data collection. Then results will be presented, analysed and discussed. Finally, conclusions will be presented and recommendations will be suggested in order to overcome the delay problem.

### **II. LITERATURE REVIEW**

Many regional and international articles and studies conducted on causes and effects of delay in buildings and roads' projects have been reviewed. Aibinu and Jagboro[3] presented the effects of delay on building construction projects in Nigeria which were cost overrun, time overrun, dispute, arbitration, litigation and legal abandonment. Alwi and Hampson [4] reported a study concerning delays within multi- storey building projects in Indonesia. They introduced thirty-one of delay factors that were classified into six major groups. They found that variable design changes and lack of trades' skills are highly frequent causes. Assaf and Al-Hejji[1] have conducted a survey on time performance of different types of construction projects in Saudi Arabia to identify the causes of delay and their importance according to each of the contract parties. During the research seventy three of delay factors were identified and classified into nine groups with regards to source of

delay. A questionnaire was developed in order to evaluate the frequency of occurrence, severity and importance of all delay factors then they were ranked according to the importance. It has been found that the average time overrun is between 10% to 30% of original project duration. Moreover, 70% of projects experienced time overrun and it has been found that 45 out of 76 projects considered were delayed.

Alaghbari et al. [5] investigated factors causing delay in building construction projects in Malaysia. They introduced thirty one factors which were grouped into four categories. It has been found that the most significant delay causes are: financial difficulties and economic problems due to owner, financial problems due to contractor, and lateness in supervision and slowness in making decisions due to consultant.

Mohammed [6] presented thirteen factors of delays in highways and bridges construction projects in Bahrain. He employed a questionnaire to gather views from engineers working for consulting companies, contractors and a client Organization. He found that the most important cause of delay is the work of services and utilities. Mahamid[7] investigated the common risks affecting the road projects in the West Bank in Palestine from contractors' viewpoint. Forty five factors of delay were defined through a detailed literature review. A questionnaire survey was performed to rank the considered factors in terms of severity and frequency. The top three risks affecting the road projects in Palestine are: financial status of the contractors, payment delays by the owner, and the political situation and segmentation of the West Bank.

Vidalis and Najafi[8] presented the causes of cost and time overruns in Florida Department of Transportation (FDOT) highway projects. An examination of 708 recently completed projects that had experienced cost and time overruns was conducted. It has been found that the predominant factors causing cost and time overrun are: plans modifications, changed conditions caused by bad detectable boring, lack of project coordination, and design related problems. Ellis and Thomas [9] investigated the root causes of highway construction delays in USA. They conducted a survey to obtain input from working professionals concerning the most frequent causes of construction delay and measures of delay avoidance. Results showed that the most frequent causes of delays in highways construction are: utility relocations, differing site conditions, errors in plans and specifications, weather, permitting issues, and owner requested changes.

After reviewing regional and international cases of studies related to building and road projects, it has been found that there are some common causes of delay between both types of projects, such as: design changes due to owner and financial difficulties. On the other hand, there are some specific causes of delay that are related to road projects which don't occur frequently in building projects. These causes are related to services and utilities, such as utility conflicts and relocations.

This study involved the common causes of delay between building and road projects as well as the specific causes related to road projects.

### **III. RESEARCH METHODOLOGY**

A preliminary survey was conducted in order to know the extent of delays significance and severity of the public sector projects relative to private sector projects, specifically the delays in road projects compared to building projects. For this preliminary survey a questionnaire was distributed for 25 engineers from both public and private sectors. As well as that, several interviews were done with construction experts from both sectors. After analyzing the results, it is found that more than half of participants agreed that there is a significant delay problem in public sector projects and specifically in road projects.

Forty seven causes and twelve effects of delay were identified through literature review and discussion with some parties involved in road construction. A questionnaire was developed in order to evaluate the frequency of occurrence and severity of the identified causes, as well as determining frequency of delays' effects.

Data were gathered through a survey, analyzed by using SPSS 20, taking in the views of the owner, represented by MOW, contractors and consultants. Significant causes of delay and their severities were identified, and recommendations to overcome these causes were suggested in view of the results of the study.

### **IV. DATA COLLECTION**

Delay causes and effects were identified from extensive literature review of several previous studies related to delay in road and building projects. Then a preliminary list of delay causes and effects was developed, and was shown to some construction experts, specifically road engineers. The road engineers were allowed to add or remove any of delay causes and effects in the preliminary list based on their experiences. Finally, the last version of list of delay causes and effects was developed. Tables 1 and 2 show the causes and effects of delay, respectively.

Data were gathered through a questionnaire which consists of an introduction and three parts. The introduction gives a description of the survey, its purpose and objectives, and provides some basic definitions. The first part is related to general information about the respondents. The respondents were requested to answer general questions pertaining to their experience and educational level.

Table 1: List of causes of delay

Groups of Causes	No.	Causes of Delay
<b>Causes related to contractor</b>	1	Difficulties in project financing by contractor
	2	Rework due to errors during construction
	3	Poor site management and supervision by contractor
	4	Poor communication between contractor and other project parties
	5	Improper planning and scheduling of project by contractor
	6	Inexperienced contractor's manpower
	7	Ineffective construction method implemented by contractor
	8	Shortage of manpower
	9	Shortage of materials
	10	Payment problems between contractor and his employees
	11	Shortage of equipment
	12	Unfamiliar foreign contractor with materials in Bahrain market
<b>Causes related to owner</b>	1	Budget availability for the project
	2	Delay in decision making by the owner
	3	Interference by the owner during construction operation
	4	Delay in progress payments by the owner
	5	Lateness in reviewing and approving contract documents by the owner
	6	Delay in approving shop drawings and sample materials
	7	Change of project scope
	8	Suspension of work by owner
	9	Poor communication between owner and other project parties
<b>Causes related to consultant</b>	1	Delay in performing testing and inspection by consultant
	2	Delay in approving major changes in the scope of work by consultant
	3	Poor communication between consultant and other project parties
	4	Delay in reviewing and approving design documents by consultant
	5	Insufficient experience by consultant
	6	Discrepancies between specifications and drawings prepared by consultant
	7	Bad project cost estimation
	8	Missing dimensions in the drawings
	9	Lack of competent person to monitor the progress at site
	10	Delay in issuing the drawings
	11	Delay in solving design problems
	12	Major change of design during construction by consultant
<b>Causes related to services and utilities</b>	1	Unclear or undefined positions of services networks in drawings
	2	Diversion of obstructing services
	3	Long response from utilities agencies
<b>Causes related to Government regulations</b>	1	Difficulties in obtaining work permits
	2	Tendering system requirement of selecting the lowest bidder
	3	Summer restriction on time of work
	4	Change in government regulations and rules

Table 1 (Continue)

Groups of Causes	No.	Causes of Delay
Causes related to Government regulations	5	Lands acquisition
	1	Hot weather effect on construction activities
Causes related to external environment	2	Traffic diversion
	3	Effect of social and cultural conditions of inhabitants
	4	Accidents at construction site
	5	Political situation and security
	6	Scarcity of materials in the market

Table 2: List of effects of delay

No.	Effects of Delay
1	Time overrun
2	Cost overrun
3	Disputes
4	Arbitration
5	Litigation
6	Breach of contract
7	Total abandonment
8	Delay of other projects related to the main one
9	Obstruction of economical and urban development
10	Disruption of traffic movement
11	Discredit the Ministry of Works among the people and in the press

The second part includes a list of the causes of delay in road projects in Bahrain. These causes are classified into six groups according to the sources of delay: Causes related to contractor, owner, consultant, services and utilities, Government regulations, and external environment. For each cause there are two main questions, one for determining the frequency of occurrence and the other one for measuring the degree of severity. Both the frequency and severity are based on a five – point scale. The third part includes a list of the effects of delay in road projects in Bahrain. For each effect there is one main question which is for measuring the frequency of occurrence which based on a five – point scale. In the second and third parts, frequency of occurrence is categorized as: always, often, sometimes, rare, and never (on 5 to 1 point scale). Similarly, degree of severity was categorized as: very severe, severe, somewhat severe, little effect, and no effect (on 5 to 1 point scale).

The questionnaire was distributed by hand and sent by e-mail to 169 road engineers working at Ministry of Works, 63 engineers working with contractors and 34 engineers working at consultant engineering offices. In approximately one month and a half, after distributing and sending the questionnaire for a second time to most of those addressed before, with daily following up by telephone, a total of 84 engineers working with the owner have responded. In addition, 36 engineers working with contractors have replied and the number of consultants that have replied is 24. The respondents were directors, heads of groups, sections’ chiefs, project managers, designers and others who have experience in this type of projects, and their educational levels ranged from Diploma of Engineering to Professional Qualification. Table 3 shows the details of questionnaire distribution and response rates.

Table 3: Questionnaire distribution and response rates

Participating Group	Population	Sample Size	No. distributed	No. Responses	% Responses
Owner	209	136	169	84	61.8
Contractors	69	59	63	36	61.0
Consultants	34	32	34	24	75.0

## V. RESULTS AND ANALYSIS

SPSS 20 was selected to perform the whole analysis, which includes two parts: delay causes and delay effects. In the delay causes' part, a mean rank was done for each cause given in Table 1 to find the severest and most frequent ones. The mean can be calculated as follows:

$$\text{Mean} = \sum (\text{weighting number} * \text{total score of frequency/ severity}) \div \text{Total No. of participants} \quad (1)$$

For all frequencies

The causes with frequencies' means of 3 or greater are considered as frequent. Moreover, the causes with severities' means of 3 or greater are considered as severe.

In delay effects' part, similar analysis was done using equation (1) to establish a mean rank for each effect shown in Table 2. The effects were ranked according to their frequencies' means to determine the most frequent ones. The effects with frequencies' means of 3 or greater are considered as frequent.

Table 4 shows the mean rank of most frequent causes of delay, where causes that have frequency mean of 3 are considered frequent. Whereas, Table 5 shows the severest causes with mean of 3 and above being ranked within each group.

Table 4: Mean rank for most frequent delay causes

Delay Causes Groups	Delay Causes	Frequencies' Means	Rank
Causes related to contractor	Shortage of manpower	3.1511	1
	Improper planning and scheduling of project by contractor	3.1387	2
	Poor communication between contractor and other project parties	3.1014	3
	Inexperienced contractor's manpower	3.0217	4
Causes related to owner	-	-	-
Causes related to consultant	-	-	-
Causes related to services and utilities	Long response from utilities agencies	4.0000	1
	Diversion of obstructing services	3.8803	2
	Unclear or undefined positions of services networks in drawings	3.7092	3
Causes related to Government regulations	Summer restriction on time of work	3.7007	1
	Difficulties in obtaining work permits	3.6159	2
	Tendering system requirement of selecting the lowest bidder	3.2462	3
	Lands acquisition	3.0290	4
Causes related to external environment	Traffic diversion	3.5874	1
	Hot weather effect on construction activities	3.5423	2

Table 5: Mean rank for severest delay causes

Delay Causes Groups	Delay Causes	Severities' Means	Rank
Causes related to contractor	Improper planning and scheduling of project by contractor	3.4820	1
	Inexperienced contractor's manpower	3.4380	2
	Shortage of manpower	3.4203	3
	Poor site management and supervision by contractor	3.3957	4
	Shortage of materials	3.3551	5
	Poor communication between contractor and other project parties	3.2336	6
	Difficulties in project financing by contractor	3.1022	7
	Shortage of equipment	3.0580	8
	Ineffective construction method implemented by contractor	3.0504	9

<b>Causes related to owner</b>	Suspension of work by owner	3.2537	1
	Change of project scope	3.2319	2
	Delay in decision making by the owner	3.0719	3
	Budget availability for the project	3.0360	4
<b>Causes related to consultant</b>	Major change of design during construction by consultant	3.5145	1
	Bad project cost estimation	3.2263	2
	Delay in approving major changes in the scope of work by consultant	3.2158	3
	Insufficient experience by consultant	3.1022	4
	Delay in solving design problems	3.0652	5
	Discrepancies between specifications and drawings prepared by consultant	3.0441	6
<b>Causes related to services and utilities</b>	Long response from utilities agencies	3.9930	1
	Diversion of obstructing services	3.9718	2
	Unclear or undefined positions of services networks in drawings	3.8500	3
<b>Causes related to Government regulations</b>	Difficulties in obtaining work permits	3.6454	1
	Lands acquisition	3.4130	2
	Summer restriction on time of work	3.2754	3
<b>Causes related to external environment</b>	Traffic diversion	3.1608	1
	Hot weather effect on construction activities	3.0704	2

Similarly effects were ranked according to their means of frequencies. Table 6 exhibits the means of frequencies of delay effects. The first and second highest effects of delay are time and cost overruns. This result is supported by Aibinu and Jagboro [3].

Table 6: Means of frequencies of delay effects

Delay effects	Means	Frequent effects
Time overrun	3.8239	√
Cost overrun	3.5141	√
Disruption of traffic movement	3.4245	√
Delay of other projects related to the main one	3.0687	√
Disputes	2.8921	
Obstruction of economical and urban development	2.5833	
Discredit the Ministry of Works among the people and in the press	2.5546	
Arbitration	2.3622	
Breach of contract	2.3203	
Litigation	2.2689	
Total abandonment	2.1304	
Total frequent effects		4

## VI. DISCUSSION OF RESULTS

This section discusses the results obtained in the previous section. First, we discuss the severest and most frequent causes of delay within each group. Second, we discuss the most frequent effects of delay

### 6.1 Causes related to contractor

*Shortage of manpower:* According to Government regulations, contractor may face difficulties in importing labours since it involves long procedure of obtaining visas, licenses and work permits for them. This procedure may prevent the contractor of providing the required manpower before construction, and may delay the progress of project [10].

*Improper planning and scheduling of project:* Improper planning and scheduling was ranked as the second most frequent and the first severest cause related to contractor. Contractors may fail to come out with a practical work program at the initial work stage. This failure is interrelated with lack of systematic site management and insufficient contractor's experience towards the projects. Improper planning at the initial stages of a project causes delays at various stages [11].

*Poor communication between contractor and other project parties:* Poor communication was ranked as third most frequent cause related to contractor. Since there are many parties involved in a project (owner, consultant, contractor, sub-contractors), the communication between them is very crucial for the success of the project. Any problem with communication can cause severe misunderstanding and therefore, delays in the execution of the project [11].

*Inexperience and shortage of manpower:* According to the respondents, contractors are still facing lack of trades' skill to complete the project satisfactorily. The quality and quantity of labor supply have important impacts on construction projects [11]. According to Government regulations contractor may face difficulties in importing labours since it involves long procedure of obtaining visas, licenses and work permits. This procedure may prevent the contractor of providing the required manpower before construction, and may delay the progress of the project [10].

*Poor site management and supervision:* Poor site management and supervision is found to be one of the severest causes of delay. The contractor may face deficiency into site planning, implementation and control. Poor site management results in slowness of responding to issues arising at the site, and may have negative impact on the overall progress of work [11].

*Shortage of materials and equipment:* The contractor obligates himself to provide the required equipment and materials to execute the project within the time schedule. Shortage or unavailability of the required equipment and materials may obstruct the progress of work and may subject the project for delay [10].

*Difficulties in project financing:* Some contractors encountered reduction in their financial resources due to the "Credit Crunch", the global financial crisis. Cash requirement for procurement of materials and other expenses could lead the contractor into a very critical situation which may obstruct the progress of work and postpone the project completion time [10].

## **6.2 Causes related to owner**

*Suspension of work by owner:* Suspension of work was ranked as the first severest cause related to owner. According to conditions of contract, the owner has the right to suspend any part of work if it is required to restudy or redesign the project to make the necessary modifications [10]. If suspension takes a long time it may obstruct the work of contractor, and causes delay for the project.

*Change of project scope:* Change of project scope was ranked as the second severest cause related to owner. Although changes are inevitable in projects, they may have negative effects. Changes are sometimes in the form of additional work, which necessitate extra resources from the contractor. Contractors are left with one of two choices, either to work at the same rate and to be behind the schedule, or to commit additional resources and ensure completion on time while incurring higher cost [6].

*Delay in decision making:* The results indicated that delay in decision making is the third severest cause related to owner. Slowness of owner in making decisions may hold back some of project activities, and delay in settlement of contractor's claims by the owner, such as approval of new work items, prices and additional costs for changes in design. This may obstruct the progress of work and subject the project for delay [10].

*Budget availability for the project:* Project starts with an idea that requires a budget to turn it into reality. According to several road engineers of MOW, the Ministry sometimes faces difficulties in approving the required budget. This may occur due to assigning available financial resources to other governmental projects. Without providing the budget, the project remains only in papers without execution.

## **6.3 Causes related to consultant**

Results showed that there are six severe causes related to consultant, these are: major change of design during construction, bad project cost estimation, delay in approving major changes in the scope of work, insufficient experience, delay in solving design problems, and discrepancies between specifications and drawings. It can be observed that these causes are related to insufficient experience of the consultant's staff.

When consultant makes fundamental changes in design, the contractor may face difficulties in construction or in finance because these changes weren't planned. Moreover, when projects' costs are under-estimated, it may be suspended by the owner due to his inability to finance additional costs. Additionally, delay in approvals by consultant could delay the progress of work and may cause delay in completion time of the project [10].

#### **6.4 Causes related to services and utilities**

All causes related to services and utilities were ranked as frequent and severe, which indicates the importance of this group. Long response from utilities agencies is ranked as the first most frequent and severest cause in this group. This may result from unavailability of materials in their stores, such as large diameter pipes and high voltage cables. Ordering and delivering these kinds of materials require several months [6]. Unclear or undefined positions of services networks in drawings can subject the project to delay; because the schedule will be changed and the newly discovered pipe or cable is required to be moved or diverted temporarily which requires additional time and money.

#### **6.5 Causes related to Government regulations**

*Difficulties in obtaining work permits:* Among the severest problems related to Government regulations which affect the progress of public road projects is the issuance of work permits. The contractor must obtain work permits from all concerned Government authorities. Each of these authorities has its own regulations and rules in issuing work permits. Contractor may face difficulties in obtaining these permits causing delay for the project [10].

*Summer restriction on time of work:* It can be indicated from results that some participants may look at this cause from business point of view, where allowing the labours to have rest from work during very hot weather may delay the project causing further cost overruns. On the other hand, some participants look at this cause from humanitarian point of view, where these labours need to have rest for their safety and to improve their productivity and quality of work.

#### **6.6 Causes related to external environment**

*Traffic diversion:* Traffic diversion is found to be the first severest and most frequent cause related to external environment. Improving the performance of an intersection by constructing a flyover and / or subway involves working at already used highway. If this highway is linking between important regions in the country, it is difficult to close it until the construction finishes. Congestions in this highway are required to be diverted for temporary ways and this may obstruct the progress of work and causes delay for the project.

*Hot weather effect on construction activities:* The climate in Bahrain is very hot, where the temperature may exceed 49 °C in summer which makes the construction very difficult. The weather may affect the productivity of labours and equipment, which may delay the progress of work [10].

#### **6.7 Delay effects**

Results indicated that the four most frequent effects of delay are:

1. Time overrun
2. Cost overrun
3. Disruption of traffic movement
4. Delay of other projects related to the main project

When the project is subjected to delay, it will exceed the specified period which means waste of time that may be used in other profit making projects. As well as that, delay causes cost overrun because time is money. The contractor will pay more for overhead, labours and machinery. On the other hand, owner's money will be tied up with this delayed project. Moreover, closing main roads for development and construction will disrupt traffic movement. Additionally, roads provide links that connect the road users to other areas that may include recreational and investment projects. So delay in road projects may lead to delay in these investment projects that depend on them.

## **VII. CONCLUSION AND RECOMMENDATIONS**

This work discussed the delay in road projects in Bahrain. It studied the frequency and severity of delay causes, as well as the frequency of delay effects. The research is a field survey through a questionnaire directed to contractors, consultants, and owner who is the Ministry of Works. It was concluded that there are many causes of delay related to contractors such as the lack of planning, shortage of manpower and materials. The major causes related to the owner, i.e. MOW, are suspension of work, budget availability and delay in decision making. The main problems related to consultants are due to lack of experience. Delay causes related to



services and utilities are the most critical factors as indicated by the high values of their severity means. Moreover, cost and time overruns and disruption of traffic movement were the most frequent effects of delay.

### **7.1 General recommendations**

This section presents the following general recommendations to minimize delay in road projects:

#### **a. Contractor should focus on the following points:**

- Give more attention to planning phase and spend more time and money for it.
- Proper planning and scheduling are required to ensure continuous progress of the project, and to match allocation of resources to the schedule requirements to avoid cost and time overruns.
- Develop human resources through continuous training programs.
- Assign sufficient number of labours that should be motivated to enhance their productivity.
- Manage financial resources and plan cash flow by utilizing progress payment.
- For site management and supervision, assign appropriate administrative staff to make the required arrangements to deliver the project within the specified cost, time and quality.
- Stay in touch with the last updates of construction technology and review the lessons learned from the previous successful projects. Take successful contractors as benchmarks.
- To minimize the effect of summer restriction on time, contractor should let the workers do their job during night or early morning, or to work extra hours in return of over time.
- Provide labours with timely breaks to overcome the effect of hot weather. Such breaks will enhance the labours' productivity and quality of work.

#### **b. Owner should give special attention to the following points:**

- Minimise change orders during construction.
- To have a contingency plan to be used in the case if any unforeseen events happen to avoid suspension of work.
- Instead of making decisions individually, it should be made collaboratively. An appropriate decision can be taken after forming interactive group in which more information and knowledge are available, and more alternatives are likely to be generated. As well as that, more acceptance of the final decision is likely to occur.
- Involve services' authorities in the planning and design phases. Regular meetings with these authorities are required to be held to identify their needs and accommodate it during planning and design phases. This approach gives the services authorities a chance to plan their work packages and manage the procurement of the required materials, such that there will be minimal negative impact on the road project.
- Select the bidder whose resources, capabilities and experience qualify him to construct the project, not the one provides the lowest offer.
- For land acquisition, involve the land's owners in the planning and design phase, understand and accommodate their needs, and reimburse them generously in return of their land.

#### **c. Consultant should look to the following issues:**

- Employ competent, experienced and qualified engineers in order to do their jobs effectively.
- Develop staff through training courses and workshops.
- Use punishment system to be applied for any employee who is slow in reviewing and approving changes requested by owner.

#### **d. Government is recommended to focus on the following points:**

- Facilitate the issuance of work permits in road projects because these projects benefit all citizens and when delay occurs it will cost the government a lot.
- Introduce a Ministry of Planning which provides long term plans for constructing large projects such as roads and flyovers. When these plans are provided, then the coordination between Ministry of Works and Ministry of Finance will be easier and the budget will be available.

#### **e. All project stakeholders are recommended to:**

- Work as a team, where every member feels that the project is his own.
- Communicate effectively, i.e. send and receive the right information using the proper communication channels. When information flow is done correctly, misunderstanding between project stakeholders will be minimized and therefore delay will be avoided.

## 7.2 Recommendations for future studies

It is recommended to further this research by investigating actual delay case studies in Bahrain. Furthermore the associated cost of delay in road projects should be studied and analysed.

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