PERFORMANCE ANALYSIS OF INTERNATIONAL DEVELOPMENT PROJECTS

Kamrul Ahsan
Department of Management
Faculty of Business, Auckland University of Technology
Private Bag 92006, Auckland 1142, New Zealand
E-mail: kamrul.ahsan@aut.ac.nz
Tel: (649) 921 9999 x 5477

Indra Gunawan
Department of Mechanical and Manufacturing Engineering
Auckland University of Technology
Private Bag 92006, Auckland 1142, New Zealand
E-mail: indra.gunawan@aut.ac.nz
Tel: (649) 921 9999 x 8075
PERFORMANCE ANALYSIS OF INTERNATIONAL DEVELOPMENT PROJECTS

ABSTRACT
This study focuses on some important issues of International Development (ID) projects. Through empirical analysis we examine ID project cost and schedule performance, implementation problems and issues related to the host country. We look at 100 projects that are sponsored by the Asian Development Bank and hosted by several developing countries. The study identifies that most late projects experience cost underrun—an unusual cost and schedule variation relation in projects. Further we discuss causes of project delay and lessons related to managing projects. Research findings will benefit ID project professionals, organizations and the ID project Body of Knowledge. The study can be extended to analyse other developing country projects sponsored by different donors.

Keywords: International development project, project execution, project performance analysis

INTRODUCTION
Public sector development projects or programs specifically designed for economic and social needs of developing countries are known as International Development (ID) projects. Since internal and domestic resources are scarce, foreign loans and assistance from donor institutions like the World Bank, development banks and host country organizations play a dominant role in financing these projects. ID projects are gaining more importance among project professionals because of their nature and contribution to developing countries.

According to the UNDP’s Human Development Report 2004, the 49 Least Developed Countries (LDC’s) in the world received US$ 55.15 billion in official development assistance in 2004 (Khang and Moe 2006). This amounts to 8.9% of the LDC’s total GDP, which is mostly allocated for ID projects. It is essential to study ID projects as they are different from usual projects, mainly due to the implementation approach (Youker 1999). The Project Management Institution (www.PMI.org) identifies that most ID projects face time and cost overrun, as well as delays in disbursement, and require major costly re-engineering. Within the PMI there is no body of knowledge, specialized global
standards or certification, nor is there any training available for ID projects. It is of importance to develop specific standards, certification programs and training for ID projects both for donor agencies and host country government’s and organizations. Robert Youker, in his presentation to the first Global Project Management Forum in 1995 in New Orleans, discussed 7 areas of ID project management and concluded that in almost every area, current project management standards and certifications need to be extended to cover ID project management (cited in Austin 2000). The International Development Special Interest Group of PMI shares this vision which has already been included within their five year strategy.


The purpose of this study is to explicate unexplored issues in ID projects through empirical research. The study looks at ID project knowledge and practice, particularly project characteristic, performance,
and implementation issues. The basis of the study is secondary source data from published post project reports of the Asian Development Bank (ADB). By analyzing the project reports we investigate project size in terms of budget and duration; project performance in terms of time and cost; reasons for project delay; implementation risk; and host country issues all of which are different from regular projects. The outline of the paper is as follows. In the next section we give a formal description of ID projects with emphasis on project classification and sponsors. Further, we analyse research data, project performance and lessons learned. Finally, the conclusion provides a summary of our study and recommendations for future research.

**FORMAL ANALYSIS OF ID PROJECTS**

International development is conducted or sponsored by international agencies for a developing or least developed country. Usually, projects that are generated for international development are known as ID projects. International development is a sub-sector of project management like other areas such as information technology, education, construction and engineering, telecommunications, manufacturing, and the service industries e.g. legal, insurance, finance, etc. (Austin 2000). The success of an ID project which is its long-term impact on the prosperity of the local population depends on how well it is prepared, and the policies behind its design (Diallo and Thuiller 2005).

The process of the ID project is more complex where there are many parties involved. Typically this includes the lender or donor, the Ministry of Finance of the host country, the client, stakeholders, a project management or coordination unit and a multitude of contractors who carry out physical implementation of most components and activities of the project. These parties are from different cultures and have different objectives within the project. The client is a sectoral ministry or institution of the host country. They are the official representative of all beneficiaries, participate in the project assessment phase, and need to closely monitor the project implementation process. Considering several stockholders and project development and implementation processes, we construct an ID project network model in Figure 1. The arrows show communication between the involved parties in ID projects and dotted lines suggest existing or possible integration between parties. There is some
interaction between donor and the host country client institution. The donor is often solely involved in
the process of project identification and development, resulting in local stakeholders feeling left out
(Youker 1999). Confirmation of donor funding is vital in ID projects, and after funding approval the
project implementation unit starts work with a project manager. Overall performance of the ID project
depends largely on these parties.

Most development projects are financed by the five major Multilateral Development Banks (MDBs),
which are the World Bank Group, the Inter American Development Bank, the ADB, the African
Development Bank and the European Bank for Reconstruction and Development, and the 21 member
countries of the Organization for Economic Co-operation and Development. According to Austin
(2000), the main lenders and the donor countries have over $200 billion in outstanding commitments
allocated for economic and social development projects in over 120 countries. The largest lender
among the five MDBs is the World Bank, which had 60% in outstanding commitments, earmarked for
1,508 projects in 1998/99, while the four other MDBs together accounted for an estimated 40% of the
$200 billion in outstanding commitments. The ADB contributed US$123.2 billion for 2002 projects
during the period 1966 to 2006 (ADB Annual Report 2006).

Identifying the project type can be valuable in deciding how best to manage the project. Typical
characteristics of projects are product projects, service projects and continuous improvement projects
(Cleland and Ireland 2006). The feature areas of project classification are based on size, application
area, priority, degree of risk, cash flow, technology, business experiences, and deliverables.
According to Youker (1999), ID projects are medium to large projects or programs. In terms of size,
this means the dimension of the project in dollar value, duration, number of people on the project, or a
combination.

The goal of ID projects is to contribute to the elimination of poverty. ID projects cover many
sectors in both soft and hard areas. Hard projects include agricultural, infrastructure development,
water supply and sanitation, etc., and examples of soft projects are resettlement, basic health care,
education, social welfare, capacity building etc. (Youker 1999, Austin 2000, Kwak 2002). Sometimes
ID projects are classified based on priority. Priorities are in terms of humanitarian need, emergency
situation, or socio-economic need. ID project deliverables are goods and services. Most ID projects are initiated for infrastructure and social development, and are design-develop-build-deliver projects where monetary benefit is not the prime objective (Quartey Jnr 1996).

RESEARCH METHODS AND DATA ANALYSIS

The research is based on ADB project data, where the ADB plays the central role of donor. The ADB prepares implementation manuals and detailed post project evaluations. The results of these evaluations are published every year and are available to the public online. The research data is based on projects from the four Asian countries of Bangladesh, China, India and Thailand where almost 50% of the world population lives and development is an ongoing process of ID projects. From the ADB website we downloaded all 100 project reports (available until June 2007) for the countries and gathered project schedule, cost, performance, procurement and lessons learned data and information. The percentage of data representation among the countries is Bangladesh 31%, China 30%, India 20% and Thailand 19%. The projects are from different areas such as agriculture, infrastructure development, water supply and sanitation, basic health care, education, social welfare, science and technology development, and capacity building. Cost and time related numerical data is obtained from project budget, schedule and performance related tables, charts and figures. There are no cost adjustments made for inflations. Other descriptive information has been collected from the project reports. We analyse numerical data in the form of descriptive statistics and causes of delay and lesson learned in the form of discussion, charts and tables.

ID Project Performance Analysis

Project duration and cost

This study addresses performance issues of ID projects in terms of the project elements of time and cost. To describe the project time parameter we consider project planned duration and actual duration. There are also two common parameters to check budget performance, which are planned budget and actual cost. For each country data we determine the mean and standard deviation of these parameters.
In general for all the countries we find that most of the studied projects are lengthy in terms of duration and take more time than expected to complete. Further details are illustrated in Table 1.

It can be seen from time performance data in Table 1 that for the studied countries the average estimated project duration is around 55 months (four and a half years) and standard deviation is 17.5 months. On the other hand, actual average project duration is 72 months (6 years) and standard deviation is around 28 months. Compared to planned project duration, average project delay is 17 months and project duration overrun is about 31%.

Table 1 also shows that ID projects are large in terms of budget. For the studied projects, planned budget per project varies from US$1.26 to 4.18 million, while the average budget per project is US$303 million and standard deviation is US$253 million. Conversely, the average actual cost per project varies from US$1.15 to 3.8 million with an average cost of US$255 million and standard deviation of US$222 million. It is significant to mention that actual cost of the ID projects is less than planned cost and budget surplus per project is on average 15%. If we compare ID project performance with other project management areas, from the Chaos Chronicles report published by the Standish Group International, INC. in 1995, it can be seen that software project cost overruns were 189% of the original estimate which in general is worse than the performance of ID projects. These cost data give an idea of project size and the issue of cost performance.

**Cost and schedule variation**

We determine schedule variation (SV) to be the difference between planned and estimated duration. A negative SV means the project is late while a positive SV means the project has been completed before scheduled time. Similarly, cost variation (CV) is measured as the difference between planned cost and actual cost. A negative CV means over budget or overspent project and a positive CV means an under budget project. We also determine the SV and CV percentage for a group of projects; SV percentage is the ratio between average SV and average planned duration of all the projects (i.e. average SV for a group/ average planned schedule). Similarly CV% is the ratio between average CV and average planned cost of all the projects.
In Figure 2, we compare countrywise performance of ID projects in terms of average schedule and cost variations. We find average countrywise SV is negative and CV is positive for all the countries. Comparing project SV and CV data, it can be seen that in India average schedule overrun is the highest (55% of actual schedule) compared to other studied nations. In China the variation is around 8.5% which is not that significant. Conversely, the cost data gives an interesting scenario for India. Even though projects in India take more time than planned, in the end the amount of cost savings is around 25% of planned cost. For China, cost savings are not that significant compared to India. Overall, most projects experience schedule overrun and cost underrun.

Figure 3 shows performance of the different groups of projects according to the following four categories: schedule overrun, schedule underrun, cost overrun and cost underrun. Among the projects, overall the percentage of schedule overrun and cost underrun projects is higher compared to cost overrun and schedule underrun projects. The group of scheduled overrun projects (first group from the bottom, Figure 3) show most ID projects experience schedule overrun problems while saving some project cost. On average 86% of projects are late, time overrun is almost two years, and projects take approximately 39% more time than planned average. On average a late project extensively saves cost by US$43 million, i.e. 14% of average planned project cost. Projects with schedule underrun (second group from the bottom, Figure 3) are few (14%), but largely save on cost. A schedule underrun project on average saves US$79 million which is 19% of project average planned cost.

On the other hand, of the cost underrun projects 86% of projects were completed within or under budget, these projects were behind schedule by 16 months with about 29% SV (first group from the top, Figure 3). Projects with cost overrun (second group from the top, Figure 3) are few (14%) and the average amount of overspending is US$73 million, i.e. 24% of average planned project cost. The major causes for cost overrun include poor financial discipline, underestimated time and cost, and poor performance on the part of project preparatory management staff.

Comparing time and cost performances of all ID projects, it can be seen that most projects (73%) are both late (schedule overrun) and save project cost (cost underrun). In contrast, only a few projects
(13%) are completed both within the schedule (schedule underrun) and save on budgeted cost (cost underrun).

**Overall project performance**

Within the ADB, project performance is also measured by overall performance rating. The rating is calculated based on the weighted average (WA) of the criteria: relevancy (with host country and ADB strategy), effectiveness (in achieving objectives), efficiency (in achieving outcome and output), and sustainability [ADB Project Performance Manual: page 7, 9] with weights 20, 30, 30 and 20 percent respectively. ADB ranks project performance as highly successful (WA >=2.7), successful (WA: 1.6 - 2.7), partially successful (WA: 0.8 -1.6), and unsuccessful (WA<0.8). To simplify project outcome our study groups performance rates as successful (S) for successful and highly successful projects and unsuccessful (U) for partially successful and unsuccessful projects. The data indicates that most ID projects (84) are recognized as successful. Comparing project success rates between countries it is evident that project success or failure varies among host countries. In some countries the failure rate is quite high (Bangladesh) while for some countries it is quite low (Thailand).

Further comparison of schedule and cost variance in relation to project success rate shows the effect of project success differs depending on whether schedule and cost variance is positive or negative. For cost variance, the more cost underrun, the higher the project success rate. For schedule variance, the later the schedule, the higher the project success rate. The difference between the marginal means of positive and negative schedule and cost variations represents an interaction between SV and CV, i.e. these factors are not independent. Further, a two-factor ANOVA-analysis without replication shows interaction between SV and CV means are not significant.
From analysis, it is apparent that most of the ID projects are late and require less budgeted cost. In the following sub-section we identify and explain the reasons for lengthy project duration and the large amount of cost savings.

**Reasons for Schedule Delay**

From ex-post project evaluation, we find that ID projects experience huge time delays in project implementation and completion. Among the projects, almost 75% experienced consultant recruitment and service related delay, 70% experienced goods procurement delay and most of the infrastructure development projects (90% of 65 projects) faced construction works delay. Other identified causes of delays are due to frequent change of scope, inexperienced project staff, unfavourable host country environment and natural calamities. Further details of the reasons of delay are described below:

- **Delays in selecting consultants and suppliers:** The influence of local government and lack of experience of local authorities is another factor contributing to project delay.
- **Procurement delays:** Long procurement bid evaluation time, delays in procurement operations by implementing organizations, and inexperience in international procurement often cause delays in procurement.
- **Protracted land acquisition problems:** Local politics, land law and religious issues can protect land from use in projects and obtaining local community approval is often a lengthy process.
- **Frequent changes of scope:** Tendency to frequently widen or change project scope by sponsor or host country can create a change of tasks and resource scheduling which may lead to a missed delivery date.
- **Governmental procedural delays:** Bureaucratic problems include a slow decision making process and institutional or other border issues, and cause frequent policy changes leading to project schedule delay.
- **Funding:** Delays in financing from donor and host country sources following project approval and occasional unavailability of funds at required time result in late projects.
• Natural calamities: Consequence of heavy rain, flood, landslide, rivers changing course, or inaccessibility of work location is often cause of project delay, particularly for infrastructure projects.

Summarizing the causes of schedule delay, a cause-and-effect diagram is developed in Figure 4. Causes of delay are mainly due to procurement, host country environment, methodology and related manpower. Each cause has sub-causes which may be related to one another. The intention of the diagram is to identify probable causes for schedule delay.

<<Insert Figure 4 approximately here>>

Cost underrun for overtime projects

Usually, projects that take more time cost more money. However, for ID projects the picture is just the opposite. Most schedule overrun ID projects experience cost underrun. Because of the unusual nature of cost and schedule variation relations it is of vast interest for this study to identify some central causes for schedule delay and cost savings. We identify several reasons behind cost underrun for overtime projects.

• Cost underrun is mainly due to depreciation of local currency against US$. Because of exchange rates, a considerable savings in foreign exchange costs result.

• Relatively large loan savings are due to competitive bidding, lower interest rates during construction, and lower than anticipated inflation. Local bidders’ prices are generally lower than those of foreign bidders and due to competitive bidding, procurement costs are lower then estimated. For example, for ADB project no. 26461 in China (available at ADB website), the actual project cost was only 60.7% of the appraisal estimate. The main reasons for this significant cost reduction are vigorous competition in the bidding process of equipment and materials, changes in market conditions, and substantial reduction in cost interest during construction due to policy changes for taxes and interest rates. While the latter is difficult to predict, other factors could have been given greater weight in estimating project costs at appraisal.

• To avoid funding crisis there is a tendency to keep a high safety buffer in the project budget. Usually, planners consider overestimated project cost during appraisal and a large amount of contingency budget and savings in physical and price contingencies.
Sometimes project scope is cut or all project activities are not implemented.

The cost of huge schedule overrun is usually offset by budget surplus due to the above factors, and in the long run instead of cost overrun, ID projects completed within the budget.

**ID Project Lessons Identified**

Analysis of ex-post evaluation shows that during project life cycle most projects experience various problems. Many projects handle these problems efficiently and consider them as lessons learned. The purpose of studying lessons learned or identified from past or existing projects is for implementation in future projects. With that aim, this study investigates several project management and host country related lessons for ID project professionals and practitioners. Project management lessons are mostly related to project planning and implementation involving stakeholders and beneficiaries, project ownership, and training related to project processes. Some of these problems and their causes have been discussed in sub-section ‘reasons for schedule delay’. There are additional issues related to host country rules and regulations, culture, natural calamities, local government support and local content issues. In this section we discuss a number of important lessons in the areas of project planning and implementation, procurement, project ownership and stakeholder participation and lastly host country related matters.

**Project planning and implementation**

Adequate planning and preparation are key elements for project execution. ID projects financed by donor agencies, particularly the ADB, need to follow a series of procedures for design and implementation. It has been established that detailed project design is necessary for many ID projects and greater attention should be paid to project cost estimates at appraisal. Computer integrated project scheduling and management systems are important for complicated projects, involvement of experienced and well-trained staff is vital, and incentives and penalties for performance must be established.
**Procurement**

Procurement is one of the biggest challenges in ID projects. From analysis of project data, it can be seen that many projects are late because of a lengthy procurement process. Causes of delay are mostly related to host country rules and regulations, bureaucracy, lack of experience and familiarity in international procurement processes etc. Procurement delays are also caused by lengthy interpretation procedures to conform to government regulations by a project implementation unit. To handle the procurement process efficiently, it is necessary to include a focal person who has ample experience in different procurement styles and who is proficient in handling the bidding process. During procurement preparation, it is also useful to assess potential risks of procedural conflict and specialists could be considered to solve this problem. A sustainable procurement system is necessary for international projects. The process goes through a lot of paper work from various decentralized and disintegrated or uncoordinated departments. There are at least four parties involved with the procurement process including local government, project donors, implementation unit, client and other related agencies. Many signatures and visits are required to get procurement approval. The bureaucratic process hinders the international procurement process and increases the cost of project or products that in the long run are paid for by stakeholders. This red tape is estimated to cost more than 10% of the value of exports in developing countries (Doing business in 2006).

In many cases the designated project procurement authority does not have adequate knowledge about donor’s rules and regulations regarding procurement. It may take a long time to provide an import licence for project components. Such bureaucracy and slow decision making is cumbersome and leads to delays in procurement. To accomplish effective project procurement it is necessary to develop an efficient procedure with less process steps, less time involved and good co-ordination between parties. Moreover, training should be given to procurement management staff to appropriately handle procurement issues.

**Ownership and participation**

In any project, ownership and participation will provide a sense of responsibility and commitment which is vital for project success. The sense of ownership should be established at the initial stage of
the project, as this will help develop commitment to execute project work. This must be instilled among project stakeholders, including consultants and contractors. Most ID projects have insufficient participation of beneficiaries. Community participation is an important feature, although most of the time less attention is given or there is delay in engaging beneficiaries within the project. In ID projects, the question of “whose project is it?” always arises. The issue of host country ownership is central for ID projects. Within the host country, ownership problems arise between implementing authority and other participative organizations. Usually, the donor plays a dominant role in ID project planning and implementation. They provide prescriptions for ID project design, plan and implementation. As a result the client or host country organization may feel left out. However, as ownership of the ID project resides with the host country this can lead to a potential conflict between the parties.

Host country commitment

A key element in ID project success is strong commitment of the host country government. This ensures that schedules are kept to the due date, procedures are adhered to, and guidance at the highest level is given when necessary. Commitment is necessary to ensure quality of the project. Prior to implementing expensive projects (for fundamental change) it is necessary to consider policy framework and political will and commitment. Project objectives should fit with government policy and strategy. Project preparation should involve extensive consultation between various departments, bureaus, and offices of the government and donor organization. Detailed host country related lessons are identified and presented in Table 2.

<<Insert Table 2 approximately here>>

CONCLUSION

This study can be considered as a unique empirical research that analyses characteristics, performances and lessons of ID projects. We analyse ADB funded projects of four countries in South and South-East Asia. The studied projects are categorized as large and medium size projects in terms of duration and total budget, as soft and hard projects in terms of application area, and as emergency and non-emergency projects in terms of execution approach. From the literature, we find that the
model for ID projects is complex. Many stakeholders are involved to carry out physical implementation of components and activities of the project. The stakeholders include lenders or donors, the Ministry of Finance of the host country, the client, a project management unit, a multitude of contractors, firms and individuals, and others.

The study performs an in-depth performance examination of 100 ID projects in terms of time, cost and scope. A countrywise comparison of cost and schedule performance shows that most projects experience schedule delay and save on budgeted cost. The major causes of project delays are recognized as unrealistic project time estimation, frequent change of scope, improper risk management, inexperienced project staff, and unfavourable host country environment for project implementation. The study further identifies an unusual nature of cost and schedule variation relation in ID projects. Generally, projects taking more time cost more money. However, we find that most scheduled overrun ID projects experience cost underrun. The main reasons are categorized as depreciation of local currency, competitive bidding price, lower than estimated inflation, overestimated project cost at appraisal and large contingency budgets. Sometimes cutting scope also saves project budgeted cost. This unusual nature of ID project performance identified will help planners and professionals better estimate project budget. If required, surplus budget can speed-up the project and minimize project delay.

The study points out several project management and host country related lessons. Host country related issues are mainly related to local rules and regulations, culture, natural calamities, local government support and local content issues. Project management lessons relate to project planning and implementation, procurement, stakeholder involvement, project ownership and project training related to project processes. These lessons are important for future ID project sponsors, professionals and practitioners in developing a new project or implementing a project in a host country.

The scope of the study covers a sizeable number of projects from four Asian countries. Research findings and conclusions however, are relevant to any ID project and applicable for any host country or continent. In future, this study can be extended to incorporate impressions of the host country as
they are the ultimate customer of the ID project. Cultural issues of the host country can also be considered as there are differences from country to country and continent to continent.

REFERENCES


Figure 1. ID project network model

Figure 2. Countrywise comparison of cost and schedule variations

Figure 3. Comparisons of project performance
Figure 4. Causes of ID project delay
Table 1: ID project cost and time performance

<table>
<thead>
<tr>
<th>Country</th>
<th>Planned duration (months)</th>
<th>Actual duration (months)</th>
<th>Variation (%)</th>
<th>Planned cost (US$ million)</th>
<th>Actual cost (US$ million)</th>
<th>Variation** (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>59.91</td>
<td>80.53</td>
<td>34.41</td>
<td>126.55</td>
<td>115.86</td>
<td>8.44</td>
</tr>
<tr>
<td>China</td>
<td>58.43</td>
<td>66.97</td>
<td>14.61</td>
<td>408.33</td>
<td>380.46</td>
<td>6.82</td>
</tr>
<tr>
<td>India</td>
<td>51.03</td>
<td>79.45</td>
<td>55.69</td>
<td>418.29</td>
<td>308.92</td>
<td>26.14</td>
</tr>
<tr>
<td>Thailand</td>
<td>46.03</td>
<td>61.09</td>
<td>32.71</td>
<td>305.84</td>
<td>229.53</td>
<td>24.95</td>
</tr>
<tr>
<td>Average</td>
<td><strong>55.05</strong></td>
<td><strong>72.5</strong></td>
<td><strong>31.69</strong></td>
<td><strong>303.49</strong></td>
<td><strong>255.45</strong></td>
<td><strong>15.29</strong></td>
</tr>
</tbody>
</table>

* variation is negative compared to planned duration
** variation is positive compared to planned cost
Table 2: Host country related ID project lessons identified

<table>
<thead>
<tr>
<th>Knowledge areas</th>
<th>Host country related lessons</th>
</tr>
</thead>
</table>
| **Government bureaucracy & interference** | • Lack of strong political commitment.  
  • Lengthy bureaucratic process and local government interference in recruiting consultants or consulting firms and suppliers.  
  • Lack of project experience leading to decision making delays in hiring consultants and procurement.  
  • Border issues with policy and institutional policy causing implementation delays.  
  • Lengthy land acquisition in civil works projects.  
  • Frequent transfer of staff from project organization by government or parent organization. |
| **Human resources**            | • Difficulty in recruiting sufficient experienced and well-trained local project implementation staff.  
  • Lack of sufficient experienced contractors in rural areas.  
  • Frequent change of government people (project director) and consequent loss of institutional memory.  
  • Use of host institution staff with little or no training. |
| **Project management capabilities** | • Project implementation guiding document outlining project scope and planning issues.  
  • Development of necessary project management capability.  
  • Inadequacy of smaller cities and towns to plan, design, and implement major projects and to operate new facilities. |
| **Community/stakeholder participation** | • Lack of community or private sector participation.  
  • Importance of public consultation for project success.  
  • Need to strengthen public-private partnerships in public utilities. |
| **Others**                     | • Unforeseen floods and other natural calamities.  
  • Inappropriate and excessively costly technology to satisfy certain group interest unduly raising project cost. |