



CHAPTER II

LITERATURE REVIEW

2.1 General

This chapter focuses on previous researches on the background of construction industry in some developing countries and the problems facing contractors and the whole construction industry.

The findings of such previous studies and researches in Cambodian construction industry including their economic background and construction activities situation are important in conducting this research. It is also important to review the organization of the contractors, their problems, performance and their classification.

2.2 Recent Situation of Construction Industry in Cambodia

2.2.1 Growth and Development of Cambodian Construction Industry

GDP growth in 2006 is estimated at 10.4%, consolidating double-digit growth of the 2 previous years. The outturn was buttressed by stronger industrial production and robust expansion in services and construction activity (ADB, 2007). Construction activity remained relatively strong due to a boom in residential and commercial buildings in Phnom Penh, the capital city and Siem Reap, the tourist and business city.

Table 2-1 Key Economic Indicators for Cambodia, 2006

Economic Indicators	Value
Surface Area (Square kilometers)	181,035
Population (Thousands)	14,163,000
Density (persons per sq. km)	78
GDP (millions of US dollars)	7,256.3
GDP per capita (US dollars)	512.3

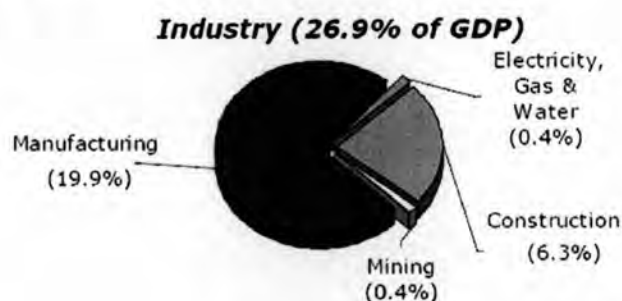
(Source: ADB, 2007)

Table 2-2 GDP of Cambodia in recent years

Indicator	2007	2008
GDP growth	9.5	9.0
Inflation	4.2	3.5
Current account balance (% of GDP)	-8.6	-10.1

(Source: ADB, 2007)

Since the year 2005, construction has been the second largest industrial sub-sector, accounting for about 25% of all industrial activities. Though official figures are difficult to obtain, there is widespread anecdotal evidence of a construction boom throughout Cambodia. Signs of a building boom are strongest in Siem Reap city, Sihanoukville port city and Phnom Penh capital city, but can be found in most provincial towns as well.



(Source: NIS, Cambodia 2005)

Figure 2-1 Construction Breakdown (6.3% of GDP in Cambodia, 2005)

Comparing the gross domestic product (GDP), the industry sector has just only 26.9% in year 2005. Whereas, in this industry sector, the construction activities has just only 6.3% compared to the overall GDP. That shows that the construction industry in Cambodia is not yet growth as other countries in the region.

2.2.2 Data of Cambodian Construction Industry

According to the report from the ministry of land management, urban planning and construction in Cambodia, the investment in construction sector of the local and foreign investors over the country in Cambodia has continually growth. The government of Cambodia has encouraged to have the investment of every sector and

2.2.3 Registration of Construction Contractors in Cambodia

According to the report from the ministry of land management, urban planning and construction in Cambodia (MLUPC, 2007), generally the construction in Cambodia divided into two parts, first the construction projects that used the state capital and second the construction projects that used private capital. For the public projects, the construction projects are done by the public ability policies under the management of ministry of economic and finance. Whereas, for the private construction projects, the owners of buildings are the persons who manage the bidding process or have a right to choose the contractors by themselves.

By the report of the ministry of urban planning and construction, all construction companies or contractors, including domestic and foreign contractors, permit to do their business in Cambodia even though they have to register for getting a license at the ministry of urban planning and construction. The construction contractors have been divided into 3 sizes differently, first is the big contractors, second is the medium contractors, and the third is the small contractors.

The construction contractors, including the design and build companies which had come to register at the ministry of urban planning and construction, counted by the end of first semester in 2007, there have been 560 companies, in which:

- The domestic construction companies are 485 and the foreign construction companies are 52.
- The domestic design companies are 22 and the foreign design company is 1.

2.3 Structure of Construction Industry

2.3.1 Concept of Construction Industry

The construction industry has an important role in economic development; it covers a wide range of operations from architectural design of a building and engineering survey to complete structures along with its maintenance during its life. In technology, it ranges from the mediaeval to the most modern. Construction

activities are undertaken by individuals and by private firms for their own use and for the government agencies. Most of these construction works are executed by a contract system.

The construction industry is one of the most cyclical industries. It experiences higher and lower lows than any other industry. Thus, the fluctuation represents the most important constraint in the construction industry, so the construction party who survives through the economic fluctuation and deserves more success and less failure is the one who understands the risks and potential rewards created by the external factors and sets a suitable organizational, business unit and functional strategies using strategic planning as a tool.

2.3.2 Construction in development

For about three decades there has been a debate in the field of construction economics on the role of the construction industry in socio-economic development, reviewed by Ofori (1993a, b). Turin (1973) postulated a causal relationship between construction and economic growth which was refined in his subsequent works. According to Turin (1973), developed countries had a stronger construction industry (which contributed 5–8% to GDP) than less developed countries (where construction contributed 3–5% to GDP). An implication for development policy was that unless the construction industry grew faster than the economy as a whole it might constraint national development.

Strassman (1970) argued that construction was a major force replacing manufacturing to drive economic growth after the initial stage of development, and postulated the 'middle-income country bulge' concept. Using the relationships derived by Turin (1973), Edmonds (1979) postulated that a minimum of 5% contribution to GDP by construction was a prerequisite for continuous economic growth. Turin's findings were generally confirmed in studies by Edmonds and Miles (1984), The World Bank (1984) and, later, by Low and Leong (1992). Ofori (1988, 1993a) and Fox (1990) tested Turin's findings with data on particular countries, and found them generally valid.

In a study on some sub-Saharan countries, Lopes (1998) found a relationship between construction and economic development, and concluded (like Edmonds) that developing countries require a minimum level of construction value added (4–5%) as a share of GDP in order to achieve long term sustainable economic growth.

Turin and his supporters have been challenged on four grounds.

- First, massive increases in construction investment are not necessarily helpful to economic growth, as consumer goods might not be produced in sufficient quantities to match the increase in wages (Schumacher, 1973; Drewer, 1975). One of the causes of an economic recession in Singapore in 1984–1985 was found to be overbuilding, which led to a drastic short term contraction of the construction industry which had been a major contributor to annual economic growth in the previous decade (Economic Committee, 1986).
- Second, the employment generating potential of construction, which was expected to drive economic growth, did not appear in several studies (Strassman, 1985). Drewer (1975) warned of possible inflationary pressures from an expanding construction industry
- Third, the accuracy of the data used has been questioned: Turin (1973) and Lopes (1998) mentioned the difficulty of obtaining reliable construction data in developing countries.
- Finally, the appropriateness of the methods of analysis adopted, and the assumptions underlying Turin's claims, were questioned (Drewer 1980). In particular, it was considered doubtful that conclusions derived from cross-sectional analyses would be valid for phenomena which are time-based (see Ofori, 1993).

Drewer (1997) found that “within a country through time, the relationship between construction and the wider economy is unstable and subject to significant variations”. He concluded that, at best, construction could be an effective motor of economic growth in a limited context and over a short period whereas, at the other extreme, economic growth led by uncontrolled expansion of the construction industry might lead to disastrous economic consequences. As noted above, a period of

overbuilding is partly blamed for the 1985 economic recession in Singapore (Economic Committee, 1986).

2.3.3 Construction problems in Developing Countries

The term 'developing countries' is loosely used to describe the countries which lie outside the small group of highly developed, industrialized nations (Kaming, 1994). Many are densely populated and becoming increasingly so while others are sparsely populated. Some have well-educated and literate populations together with partially good infrastructure and facilities but others do not have these advantages. A few are on the threshold of becoming newly industrialized states (NICs) while several are economically backward and others are desperately poor (Kaming, 1994).

It is so important to describe, realize and review the problems of the Construction Industry (CI) development by construction researchers in selected developing countries. Problems identified date include: material shortages, lack of skilled human resource, financial problems, marketing problems. Low on-site productivity and poor in-company performance, and legal issues related to regulation and economy. The problems are described as follows:

2.3.3.1 Material and technological problems

Low level of technological development in most of the industries, with shortages of plant and equipment, inadequate R&D facilities and programmes, and poor linkage between research and practice, and lack of development of manufacturing are the most common material and technological problems in developing countries. The main cause of material shortages in various developing countries is the lack of local material development programme (Ofori, 1990). Despite the abundance of natural resources which can be developed as construction material, Nigeria still suffers from this problem.

Similarly in Algeria, Abdelhalim and Duff found that the Algerian construction firms complained of the difficulty of acquiring construction materials. In addition to the problem of material supply, there are other significant constraints: insufficient quantity of material needed, delivery time too long, waiting list too long, and remoteness of the supply enterprise.

2.3.3.2 Shortage of Skilled Labor Resources

Lack of skilled construction personnel in developing countries has been traced to the poor social image of construction. Self employment of construction laborers and operatives has led to poor job security which has contributed to the shortage of talented and dedicated workers. Prospective skilled workers are better off in other industrial sectors rather than construction. Skilled labor shortages will be an acute problem in the future if the status, remuneration and job security of the construction worker is not improved.

2.3.3.3 Financial problems

Financial problems often result in time and cost overruns on construction projects. The problems are generally influenced by a multiple of factors including the capital base of the company, work load, payment for completed works by clients, rate of resource utilization, price of the materials which often fluctuate and cost of machinery etc. Financial institutions are reluctant to help construction because the industry is considered a high risk business.

2.3.3.4 Marketing problems

The fluctuating overall level of construction activities has been considered as a major problem in the industry especially in relation to resource utilization and overhead cost. During the oil boom period, the developing countries from OPEC enjoyed an unprecedented inflow of capital leading to a constructor's market with abundant work for contractors. The situation has since been reversed in these countries.

2.3.3.5 Labor Productivity problems

Olomolaiye (1990) investigated problems influencing craftsmen's productivity in Nigeria. They found that only 50% of the working day is utilized by craftsmen for productive work, the rest being spent in relaxation, waiting for tools, materials, and taking instructions. Construction planners in Nigeria often guess the outputs of building craftsmen because of unavailability of production data. Since it was difficult to draw reliable construction programmes or make accurate cost estimates without an

adequate knowledge of output, they suggested that outputs should be determined scientifically and that time study was a possible technique for future data collections.

Like many developing countries the Brazilian building industry, which was categorized by Wema (1993) as in post infancy stage, still suffers from low level of productivity, incapacity to deliver at a cost affordable to the majority of the population, high costs and low quality of products. Construction productivity in Brazil is 5-10 times lower than those in Japan and Europe. The high cost of construction in Brazil has also been traced to improper material handling. Wema (1991) stated that about 28% of the materials utilized on a building site are wasted due to mismanagement, and malpractice in the building process, accounting for 13% of the total building cost.

2.3.3.6 Legal issues and politics

Complexity of procedures and regulations, delay in payments and unsuitable contract documents are the major legal problems of contraction industry in the developing countries (Ofori, 1993). Aniekwu and Okpala (1987) found that contractual arrangements and performance of the Nigerian construction industry are closely linked. They argued that time and cost overruns, poor quality of work, low level of productivity (especially in projects handled by indigenous contractors) can all be traced to legal provisions in the assigning contract. Some of their views can be summarized as follows:

- Most developing countries have a labor intensive construction industry, whereas contract conditions are designed for more capital intensive construction industry.
- Whilst delays and cost overruns in construction projects can be controlled by special provisions within the conditions of contract, these provisions should be suitable for the intended environment.
- The problem of inadequate supply of skilled labor and experienced managers accentuated by the high level of unemployment which is prevalent in Nigeria, are some peculiar issues which the provisions in contractual arrangements do not address fully. This is probably because

they are not the basic problems of the developed countries where contractual documents are designed.

- Some contractors are not aware that there are laws governing the health, safety and welfare of workers. Most workers are illiterate and do not know their rights.

Table 2-3 Construction industry problems in developing countries

Problem Classification	Problem Identification
Material shortage and technological problems	<ul style="list-style-type: none"> - Fluctuation of the price of construction material. - High cost of material. - High cost of machinery. - High transportation and handling cost. - High machinery maintenance cost. - Inadequate production of raw material in the country. - Frequent shortage of construction material. - Low level of technological development in most of the industry. - Lack of R&D facilities and programmes. - Poor linkage between R&D and practice.
Underdevelopment of human resources	<ul style="list-style-type: none"> - Low quality of workmanship. - Poor image of status of construction workers. - Deficiency in management level. - Inadequate skilled labor in particular crafts. - Low pay for construction worker. - Poor industrial relations in construction. - Lack of co-ordination between designer and contractors. - Excessive bureaucracy or paper work. - Unnecessary legality. - Communication problems.
Financial problems	<ul style="list-style-type: none"> - Poor cash flow. - Mode of financing and payment for complete work. - High interest rates charged by banks on loans. - Poor financial control on-site.

Table 2-3 Construction industry problems in developing countries (Continues)

Problem Classification	Problem Identification
Financial problems	<ul style="list-style-type: none"> - Wrong method of estimating. - Lack of capital. - Delay of budgetary allocation.
Marketing problems	<ul style="list-style-type: none"> - Domination of CI by foreign firms. - Numerous constructions going on at the same time. - Fluctuating overall level of construction activity.
Productivity problems	<ul style="list-style-type: none"> - Improper planning. - Frequency of design changes. - Long period between design and time of tendering. - Deficiency of on-site material management. - Absence of cost data in construction. - Lack of an effective method of construction. - Poor working environment. - Poor financial incentive programme.
Legal issues and politics	<ul style="list-style-type: none"> - Fraudulence and kickbacks. - Poor documentation of contract management. - Lack of government policies for construction. - Lack of legality in solving dispute. - Bureaucracy of tendering method. - Poor contractual procedures. - Unsuitable documents of contract arrangement.

(Source: Kaming P.F., et al, 1994)

The Malaysian construction industry, like that of other developing countries, also has problems of project time overrun, resulting not only in high cost overrun but also loss of anticipated revenue. Many government projects experienced this problem and in consequence cost was doubled on some projects. After a thorough investigation the Malaysian Government concluded that the problem lay in the procurement method (Yong, 1987).

Construction industry problems in the developing countries can be broadly classified into six areas as presented in Table 2.3.

2.4 Contractors' Problems in Developing Countries from Previous Studies

Several studies had conducted on causes of delay in construction projects both locally and internationally. Surveys conducted by Assaf et al. (1995) outlined 56 main causes of delay in the large construction projects. Delay factors were assembled into nine major groups with different levels of importance to different parties. Another study by Al-Ghafly (1995) was discussed the delay in public water and sewage projects. It found that sixty causes were identified and classified. Al-Ghafly (1995) concluded the following: the delay occurred frequently in medium and large size projects, and considered severe in small projects. There are many important causes of delay related to the owner category, contractor performance, and the early planning and design of the project.

A survey of delay factors in Hong Kong projects which conducted by Chan and Kumaraswamy (1997) to evaluate the relative importance of 83 potential delay factors and found five principal factors: poor risk management and supervision, unforeseen site conditions, slow decision making, client-initiated variations, and work variations.

Kaming et al. (1997) studied influencing factors on 31 high-rise projects in Indonesia and found out that cost overruns occur more frequently and are more severe problem than time overruns. They pointed out that the major factors influencing cost overrun are material cost increase due to inflation, inaccurate material estimation and degree of complexity. While in time overrun, the most important factors causing delays are design changes, poor labor productivity, inadequate planning, and resource shortages.

Noulmanee et al. (1999) investigated causes of delays in highway construction in Thailand and concluded that delays can be caused by all parties involved in projects; however, main causes come from inadequacy of sub-contractors, organization that lacks of sufficient resources, incomplete and unclear drawings and deficiencies between consultants and contractors. The study suggested that delay can be minimized by discussions that lead to understanding.

Sadi and Sadiq (2006) had researched the causes of delay in large construction projects, with the respondent included 23 contractors, 19 consultants and 15 owners

out of 66, 51 and 27 distributed questionnaires, respectively. The contractors surveyed are categorized as grade 2 or above. The three ranking indices explained earlier were used to rank delay causes from viewpoints of the three parties (owners, contractors and consultants). Table 2-4 shows a list of causes of delay categorized into the mentioned nine groups.

Table 2-4 List of causes of delay (contractors' problems) categorized into nine groups

No.	Causes of Delay	Group
1	Original contract duration is too short	Project
2	Legal disputes between various parts	Project
3	Inadequate definition of substantial completion	Project
4	Ineffective delay penalties	Project
5	Type of construction contract (Turnkey, construction only,.)	Project
6	Type of project bidding and award (negotiation, lowest bidder,.)	Project
7	Delay in progress payments by owner	Owner
8	Delay to furnish and deliver the site to the contractor by the owner	Owner
9	Change orders by owner during construction	Owner
10	Late in revising and approving design documents by owner	Owner
11	Delay in approving shop drawings and sample materials	Owner
12	Poor communication and coordination by owner and other parties	Owner
13	Slowness in decision making process by owner	Owner
14	Conflicts between joint-ownership of the project	Owner
15	Unavailability of incentives for contractor for finishing ahead of schedule	Owner
16	Suspension of work by owner	Owner
17	Difficulties in financing project by contractor	Contractor
18	Conflicts in sub-contractors schedule in execution of project	Contractor
19	Rework due to errors during construction	Contractor
20	Conflicts between contractor and other parties (consultant and owner)	Contractor
21	Poor site management and supervision by contractor	Contractor
22	Poor communication and coordination by contractor with other parties	Contractor
23	Ineffective planning and scheduling of project by contractor	Contractor
24	Improper construction methods implemented by contractor	Contractor
25	Delays in sub-contractor work	Contractor
26	Inadequate contractors' work	Contractor
27	Frequent change of sub-contractors because of their inefficient work	Contractor
28	Poor qualification of the contractor's technical staff	Contractor
29	Delay in site mobilization	Contractor

Table 2-4 List of causes of delay categorized into nine groups (Continues)

No.	Causes of Delay	Group
30	Delay in performing inspection and testing by consultant	Contractor
31	Delay in approving major changes in the scope of work by consultant	Contractor
32	Inflexibility (rigidity) of consultant	Contractor
33	Poor communication/coordination between consultant and other parties	Contractor
34	Late in reviewing and approving design documents by consultant	Contractor
35	Conflicts between consultant and design engineer	Contractor
36	Inadequate experience of consultant	Contractor
37	Mistakes and discrepancies in design documents	Design
38	Delay in producing design documents	Design
39	Unclear and inadequate details in drawings	Design
40	Complexity of project design	Design
41	Insufficient data collection and survey before design	Design
42	Misunderstanding of owner's requirements by design engineer	Design
43	Inadequate design-team experience	Design
44	Un-use of advanced engineering design software	Design
45	Shortage of construction materials in market	Materials
46	Changes in material types and specifications during construction	Materials
47	Delay in material delivery	Materials
48	Damage of sorted material while they are needed urgently	Materials
49	Delay in manufacturing special building materials	Materials
50	Late procurement of materials	Materials
51	Late in selection of finishing materials due to availability of many types in market	Materials
52	Equipment breakdowns	Equipment
53	Shortage of equipment	Equipment
54	Low level of equipment-operators' skill	Equipment
55	Low productivity and efficiency of equipment	Equipment
56	Lack of high-technology mechanical equipment	Equipment
57	Shortage of labors	Labors
58	Unqualified workforce	Labors
59	Nationality of labors	Labors
60	Low productivity level of labors	Labors
61	Personal conflicts among labors	Labors
62	Effects of subsurface conditions (e.g., soil, high water table, etc.)	External
63	Delay in obtaining permits from municipality	External
64	Hot weather effect on construction activities	External

Table 2-4 List of causes of delay categorized into nine groups (Continues)

No.	Causes of Delay	Group
65	Rain effect on construction activities	External
66	Unavailability of utilities in site (such as, water, electricity, telephone, etc.)	External
67	Effect of social and cultural factors	External
68	Traffic control and restriction at job site	External
69	Accident during construction	External
70	Differing site (ground) conditions	External
71	Changes in government regulations and laws	External
72	Delay in providing services from utilities (such as water, electricity)	External
73	Delay in performing final inspection and certification by a third party	External

(Source: Sadi and Sadiq 2006)

2.4.1 Severity of delay causes in contractors' problems

According to Sadi and Sadiq (2005), the most severe causes of delay, indicated by all parties separately, will be highlighted. Owners point out most of the severe causes of delay to contractor and labors. Inputs of owners underline that delay of progress payment by the owner is one of the most severe causes of delay. The most severe causes of delay as seen by the owners are as follows:

- Shortage of labors.
- Inadequate contractors experience.
- Ineffective planning and scheduling of project by contractor
- Low productivity level of labors.
- Rework due to errors during construction.
- Delay in progress payments by owner.
- Original contract duration is too short.

Similar to owners, consultants indicate that the most severe causes of delay are related to contractors. Following are the most severe causes of delay as seen by the consultants:

- Difficulties in financing project by contractor.
- Inadequate contractors experience.
- Shortage of labors.

- Delay in progress payments by owner.
- Delay in material delivery.
- Poor site management and supervision by contractor.
- Ineffective planning and scheduling of project by contractor.
- Type of project bidding and award.
- Poor qualification of the contractor's technical staff.
- Low productivity level of labors.
- Unqualified work force.

2.4.2 Frequency of delay causes

Table 2-5 shows the most frequent causes of delay according to the owners, contractors and consultants. The importance index of each cause is calculated as a product of both frequency and severity indices.

Table 2-5 Frequency of delay causes

Rank	Owners	Contractors	Consultants
1	Type of project bidding and award	Delay in progress payments by owner	Type of project bidding and award
2	Shortage of labors	Suspension of work by owner	Change orders by owner during construction
3	Ineffective planning and scheduling of project by contractor	Late in reviewing and approving design documents by owner	Shortage of labors
4	Low productivity level of labors	Change orders by owner during construction	Ineffective planning and scheduling of project by contractor
5	Unqualified work force	Late procurement of materials	Delay in progress payments by owner
6	Change orders by owner during construction	Mistakes and discrepancies in design documents	Low productivity level of labors
7	Hot weather effect on construction activities	Delays in producing design documents	Unavailability of incentives for contractor to finish ahead of schedule
8	Type of construction contract (turnkey, construction only)	Difficulties in financing project by contractor	Ineffective delay penalties
9	Poor site management and supervision by contractor	Late in reviewing and approving design documents by consultant	Hot weather effect on construction activities
10	Conflict encountered with sub-contractors' schedule in project execution	Slowness in decision-making process by owner	Poor qualification of the contractors technical staff

(Source: Sadi and Sadiq, 2006)

There are many causes which are common between two parties, such as delay in progress payments by owner, ineffective planning and scheduling of project by contractor, poor site management and supervision by contractor, shortage of labors and difficulties in financing project by contractor.

2.4.3 Comparison of top problems for contractor in previous studies

One study had focused the problems causing delays on construction projects which were conducted by Baldwin and Manthei (1971) who cited 17 delay factors that resulted in delays in the United States. These factors include: weather, labor supply, subcontractors, design changes, shop drawings, foundation conditions, material shortage, manufactured items, sample approvals, jurisdictional disputes, equipment failure, and type of contracts, construction mistakes, inspections, finances, permits and building codes. Other factors contributing to construction delays are labor–management relations, strikes, poor organization, scheduling, coordination, and deteriorating quality of workmanship, productivity, lack of skills in craftsmen, quality of training, delivery delays and the high cost of financing (Baldwin and Manthei, 1971).

Previously, the researches related to the problems causing construction delays were carried out in Thailand (Ogunlana et al., 1996), Indonesia (Kaming et al., 1997), Hong Kong (Chan and Kumaraswamy, 1997; Kumaraswamy and Chan, 1998), Lebanon (Mezher and Tawil, 1998), Saudi Arabia (Assaf et al., 1995; Al-Khalil and Al- Ghafly, 1999; Assaf and Al-Hejji, 2006), Malaysia (Lim and Mohamed, 2000; Abdul-Rahman et al., 2006; Sambasivan and Soon, 2007), Ghana (Frimpong et al., 2003; Frimpong and Oluwoye, 2003), Vietnam (Long et al., 2004), Kuwait (Koushki et al., 2005) and UAE (Faridi and El-Sayegh, 2006).

By the literature review, most research studies examining problems causing construction delays employed the questionnaire approach and occasionally interviews to obtain problems causing delays in construction projects. Not only are their findings quite comparable across various geographical regions, these research studies have mostly emphasized a collaborative or partnering approach, continuous involvement throughout the project development, and increased use of value engineering to overcome the problems resulting in construction delays. They also put a strong

emphasis on thorough planning, realistic scheduling and continuous monitoring to avoid construction delays.

Table 2-6 Problem Categories classified in previous research

No.	Problem Category	No. of items in category
1	Problems related to client	8
2	Problems related to designers	6
3	Problems related to project management/consultants	15
4	Problems related to contractors	8
5	Problems related to labor	6
6	Problems related to finance	5
7	Problems related to contract	5
8	Problems related communication	6
9	Problems related to site and environment	11
10	Other miscellaneous factors	5
	Total problems	75

(Source: Sadi and Sadiq, 2006)

By the latest research by Toor and Ogunlana (2008), these both scholars study the problems causing delays in major construction projects in Thailand. The research was conducted by preliminary interview and pilot surveys with academic experts and construction professionals to check the detail of the problem inventory. That procedure generated a list of 75 problems under 10 sub-categories shown in Table 2-6 and its description in Table 2-7.

Table 2-7 Problems category and description

Problems category	
<u>Problems of Client</u>	<u>Problems of Designers</u>
<ul style="list-style-type: none"> - Confusing and ambiguous requirements - Improper project feasibility study - Lack of owners' representative - Lack of clear bidding process - Delay of payment by client - Too many scope changes and constructive changed orders - Slow responses from the client organization - Wrong choice of contractor or consultant 	<ul style="list-style-type: none"> - Low constructability of design - Over-design increasing the overall cost - Errors and omissions in design documents - Lack of standardization in design - Impractical design - Lack of involvement during construction stage

Table 2-7 Problems category and description (Continues)

<p style="text-align: center;"><u>Problem of Project Manager</u></p> <ul style="list-style-type: none"> - Inadequate experience of staff - Slow response - Lack of consultation with client - Lack or responsibility - Failure to utilize tools to manage the project symmetrically - Poor leadership on part of the project manager - Lack of timely decisions and corrective actions - Large number of participants of project - Involvement of several foreign designers and contractors - Unrealistic project schedule - Poor project planning and control - Bureaucracy at the workplace - Lack of top management commitment - Lack of project manager's experience - Unreasonable risk allocation 	<p style="text-align: center;"><u>Problems of contractor</u></p> <ul style="list-style-type: none"> - Lack of competent subcontractors/suppliers - Lack of necessary machinery, tools and automation available for project - Lack of contractor's experience and control over project - Poor efficiency of supervisor or foreman - Using obsolete technology - Contractor's financial difficulties - Inappropriate construction methods - Lack of good relationship with client/consultant
<p style="text-align: center;"><u>Problems of labor</u></p> <ul style="list-style-type: none"> - Absenteeism problems - Unavailability of local labor - Non-cooperation from labor unions - Unskilled labor - Sever overtime and shifts - Poor labor productivity problems 	<p style="text-align: center;"><u>Problems of finance</u></p> <ul style="list-style-type: none"> - High interest rate - Increase cost due to high inflation during the project - Interference in owner's decisions - Shortage of funding - Unforeseeable financial and economic crises
<p style="text-align: center;"><u>Problems of contract</u></p> <ul style="list-style-type: none"> - Poor contract management - Legal issues arising due to local government rules and regulations - Lack of cooperation from local authorities - Incomplete contract documents - Inappropriate method of dispute resolution 	<p style="text-align: center;"><u>Problems of communication</u></p> <ul style="list-style-type: none"> - Unclear lines of responsibility and authority - Lack of communication the requirements - Lack of effective inter-organizational communication - Lack of coordination among project team members - Multicultural and multilingual environment causing ineffective communication - Lack of IT use for information, coordination and interface management

Table 2-7 Problems category and description (Continues)

<u>Problems of site and environment</u>	<u>Problems due to other factors</u>
<ul style="list-style-type: none"> - Unforeseen gerund conditions - Inaccurate site investigation - Poor site access or availability - Lack of temporary facilities on site (buildings, phones, electricity, etc.) - Site pollution and noise - Severe weather problems (hot, cold, rainy) - Poor site layout - Poor site storage capacity - Difficult site terrain to work - Poor site management and slow site clearance - Poor safety conditions on site 	<ul style="list-style-type: none"> - <i>Force majeure</i> and acts of God - Lack of available resources - Non-value added works - Poor quality control over project - Fraudulent practices and kickbacks

(Source: Toor and Ogunlana, 2008)

The top problems causing construction delays in selected studies are shown in Appendix-C. These selected studies represent a range of various countries where the research was conducted, different kinds of construction projects using different procurement systems, and different periods during the past two decades. It seems as if problems causing delays are nearly the same in developing countries with minute contextual differences. Common problems of delays in most studies include: lack of resources (material, labor, finances, etc.); lack of adequate communication; poor contractual management; design delays; changed orders; deficiencies in public agencies' organization; deficiencies in planning and scheduling; inadequate site planning and control; lack of experienced subcontractors and nominated suppliers; poor judgment in estimating resources. However, the Appendix-C also shows some emergent problems in the research studies published during the past five years. These problems include: lack of contractor's experience; slowness of the owner's decision-making process; owner's lack of experience; escalation in material prices; lack of construction labor; complex and constantly evolving legal systems; and lack of standardization in design.

2.5 Construction Industry Development

2.5.1 Components of Study of Construction Industry Development

According to Ofori (1994) research on construction industry development and the effort to implement its findings both have the broad aim of solving the problems facing the construction industries of developing countries, thus improving their performance. The practice of construction industry development involves:

(a) *materials development* - replacement of imported materials with local ones through government's support for research and development (R&D) on, and promotion of, locally developed materials, assistance for their manufacturers, and revision of building regulations and bye-laws to permit their use;

(b) *human resource development* - education, training and continuous professional development to relieve the scarcity of skilled construction personnel;

(c) *development of contract documents* - rationalization and simplification of the documents used on construction projects;

(d) *contractor development* - provision of technical assistance, finance, projects and training for small and medium-sized contractors to improve their performance and promote their growth; and

(e) *technology development* - development of medium-level construction techniques, and the related equipment and tools for labor-intensive constructions and upgrading of conventional technologies to improve productivity.

Other areas include: institution building - setting up of public agencies, professional institutions and trade associations to initiate, implement and monitor measures for improving the construction industry (Ofori, 1994).

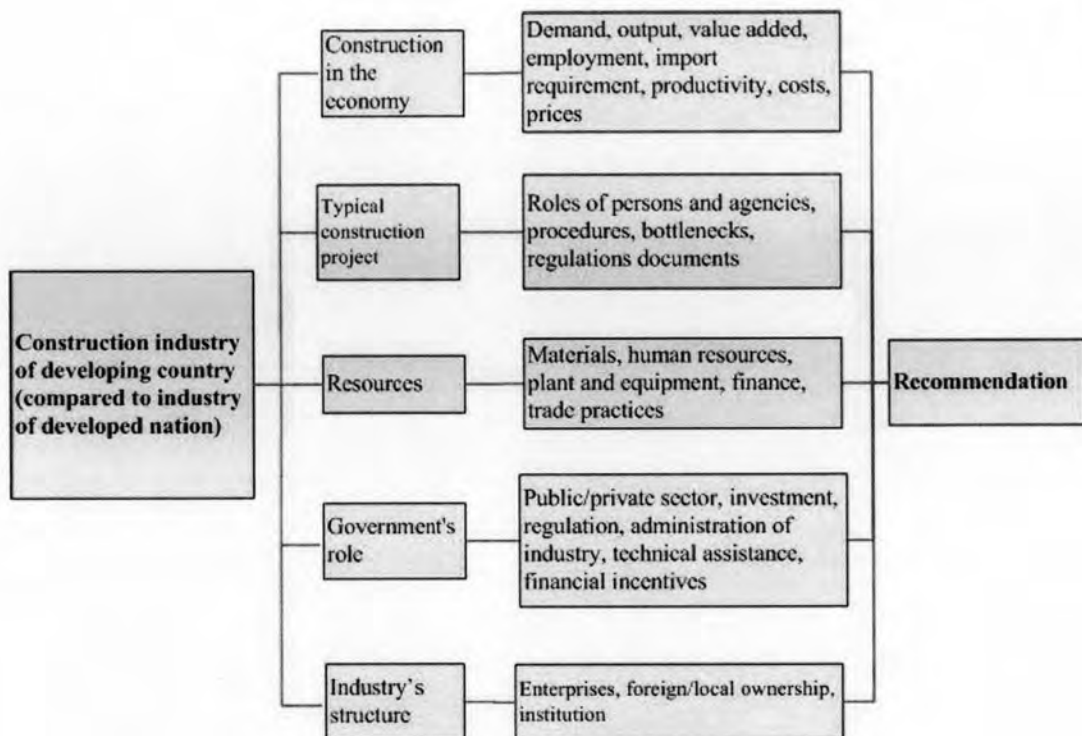


Figure 2-4 Main components of study of construction industry development by comparison between the countries

(Source: Ofori, 1994)

Figure 2-4 indicates main themes of the study of construction industry development in Singapore. The lack of advancement in this field of knowledge is discussed by Ofori (1993). His paper considers practical aspects of construction industry development. The best in construction development is to study the comparison the construction industry in one country compared to other country in the region or further.

By reviewing this study, we can get some ideas as the scope for this research. That is why we need to compare the data of contractors' problems between Cambodia and Thailand in order to find the best solutions and recommendations as the guideline for Cambodia.

2.6 Summary

Information obtained from reviewing literature on the construction industry in Cambodia and the developing countries provides a background and some guidelines for this study. The literature review in this chapter was covered the following topics:

- brief background of Cambodia (Economic overview and Construction Situation) that could help this research more understanding about the situation of construction industry activities growth and development in Cambodia for the last decade.
- concept and problems in construction industry are important for reviewing and defining the contractors' problems for this research
- participants and sectors involved with the construction contractor, this showed what partner that are participating and affecting to the contractors. The contractors' problems with these construction participants would be discussed this research in the mean of survey.
- Contractors' problems and delays in construction that affected the contractors were collected in some developing countries as a major literature review for the whole chapter. Furthermore, the contractors' problem in Thailand is very important part for this research because it would be used to compare with Cambodia.