Contract and Claim Prevention in Major Projects: a Study on Petrochemical Projects in Iran

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MEHDY NAIMI

School of Mechanical Aerospace and Civil Engineering
ABSTRACT

The construction industry is notorious all over the world for disputes and claims. In large scale projects these claims are often more frequent and more expensive. The contract is the legal frame work of the project and forms project culture, therefore is a logical starting point for any attempt in reducing project claims.

This research initially intended to study the possibility of drafting a robust contract which can prevent claims in major projects, and the main characteristics of such contract. However a review of contract related theories (transaction cost economics, agent theory and relational contracting) revealed that there is no such thing as perfect contract; and that contracts are invariably incomplete and prone to formation of claims.

Traditional management theory considers disputes in project as pathological and tries to prevent them. The development and use of standard forms of contract was an attempt to tackle the problem of claim in the construction project, yet today more than 50 standard forms are in use in the UK alone and the rate of claims is at its highest ever. Much of the literature introduces partnering as a panacea for the current plague of disputes and claims. However this idea is seriously challenged by some scholars.

Complexity science maintains that projects are complex systems and conflict occurs naturally. Conflicts are neither good nor bad by themselves; however the system needs re-adjustment after such conflicts. Flexibility of contracts or error controlled regulation can enhance such readjustment measures in the system.

To get first hand information about the nature of claims from practitioners in major projects different methods of data gathering have been used. Three case studies, a set of interviews and a questionnaire survey have been conducted. Using a grounded theory like approach some repeating patterns of forming claims in the oil, gas and petrochemical projects are identified. Considering that all data have been gathered from Iranian projects, Iranian national culture has also been studied.

The research concludes that contracts cannot prevent claims no matter how well they are drafted; nevertheless a poorly drafted contract can cause dispute. Some areas for improvement have been identified in the Iranian oil, gas and petrochemical sectors. By analyzing the data and studying standard contracts some suggestions are made. In practice, stake holders try to preserve flexibility and rearrange relationships to keep continuity of contract and complete their projects.

Keywords: Major projects, contract, claim, dispute, transaction cost, claim prevention, complexity, culture,
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DECLARATION

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CHAPTER ONE – INTRODUCTION

1.1. Background (Research Rationale)
Most construction industries are known for their high number of disputes and litigations. Many scholars and reports by professional bodies and governments confirm this fact. For instance see Latham, 1994; Zack, 1995; Fenn et al., 1997; Egan, 1998; Saad et al., 2002; Harmon, 2003.

Different scholars ascribe this phenomenon to different reasons, from complexity of output, to high number of people and organisations involved, to the long duration of projects (among others Harmon, 2003; Jergeas, 1992).

The situation in large-scale construction projects is even worse as:

1. Major projects can take a few years to complete and there is more chance of dispute and confrontation over such a long period.
2. Major projects usually require high front-end investment.
3. There is usually a high number of stake holders which increases the risk of arising dispute between them.
4. These projects usually contain technical difficulties which can be a source of disputes.
5. Large scale projects inherently have more uncertainties and these uncertainties are potential sources of disputes and claims.
6. In a large scale project the client is usually the government. It will be shown in the research that this fact imposes certain limitations on contractors facing disputes but at the same time creates opportunities for resolving disputes.

There are many definitions for dispute, conflict and claim. It has even been claimed that these terms are often used interchangeably in practice or even in the literature (Morgan, 2008).
Most of the literature considers conflicts as dysfunctional phenomena or bugs in the system and tries to manage if not prevent them (Pondy, 1967; Deutsch, 1973); however there is a new school of thought that looks at conflicts as a tool for innovation and encourages them. For instance Pascale (1991) explains the essence of conflict for innovation and emergence of new ideas using the Japanese proverb “the moment two bubbles are united, they are both vanished”. Andrade et al. (2008) also consider conflict as the fuel that drives system growth and enables learning and adaptive behaviours which make innovation possible. They even maintain that any attempt at eliminating or reducing conflict is a “fool’s errand” because it reduces the “life force of the system”. These relatively new ideas lead to taxonomy of conflicts and distinction between different types of conflict.

A contract as a legal framework of a project has a crucial role in forming the relationship between the project stakeholders; therefore it has a pivotal role in the formation of conflicts. The question that arises here is ‘how can contracts prevent disputes in the projects?’

The traditional school of thought which has been dominant since the late nineteenth century believes that detail contracting and close monitoring of project performance can avoid disputes between the client and contractor. Over the years attempts have been made to draft flawless contracts which predict all possible situations in client-contractor relations and provide appropriate provision for dealing with them during the course of a project. Such contracts are known as standard forms of contract. The first versions of standard forms of contract have been published in the late 19th century and hundreds of them have been prepared since then. Once in a while new strategies and initiatives are introduced and new forms of contracts are published to accommodate such provisions. Today more than fifty standard forms of contract are used in the UK alone (Clamp et al, 2007 and Lowe, 2007).

In contradiction to this dominant view, there are other theories which affirm that complete contracts are not possible and all contracts are inherently incomplete. Three of these theories are discussed in this research and although these theories
have their roots in different disciplines, their position towards contracts is pretty much the same. These three theories are:

- Principal / Agent theory (Marketing)
- Transaction Cost Economy (Economics)
- Relational Contracting (Law)

They all recommend a set of non-contractual measures for regulating the relationship between the parties to reduce, if not prevent, disputes and claims. In the case of major projects, due to a higher level of uncertainty, incompleteness of the contract is a more serious challenge and the role of non-contractual measures is even more significant.

Complexity science can be used to support the idea of insufficiency of contracts in avoiding disputes in the following two ways:

Firstly, some researchers such as Bertelsen (2003), Bertelsen and Koskela (2003) and Lucas (2000) argue that construction projects are complex systems. Looking at conflicts and dispute through the complexity lens, Andrade et al. (2008) as well as Pascale (1991) see conflict as a fuel that enables system growth and enables learning which makes innovation possible. They maintain that conflicts are naturally occurring, unpredictable and any effort to prevent them is doomed.

Secondly, cybernetics is the science of control and it is used for controlling different types of complex systems. Cybernetics maintains that in order to keep a system in the desired condition two types of regulations are required: Anticipatory regulations and error-controlled regulations. In project management contract functions as a set of anticipatory regulations, however it cannot keep a project in the planned situation (i.e. keep it under control) on its own. Error-controlled regulations are also required. In construction, effective communication methods such as regular site meetings between a client and contractor can function as error-control regulators.

Over the years many attempts have been made to prevent the formation of disputes and claims in construction projects; however one cannot claim that the result was quite satisfactory. Some scholars such as Owers et al (2007) and Shumway et al.
(2004) criticise “Lawyerisation” of the construction industry and report that there is evidence which shows that the rate of disputes and claims has been increased despite all efforts.

Different procurement strategies which have been developed during the past decade have all tried to tackle these problems, but as Sleep (1997) says they sometimes look like “comedies of errors” when they are studied retrospectively.

In the oil and gas industry engineering, procurement and construction (EPC), also known as turnkey, contracts has been strategy of choice since early 80s.

Partnering arrangements are the latest in the line of such strategies and today it is widely known and advertised as the method of choice for overcoming adversarial relations in the construction industry. Although there is no doubt that some aspects of partnering can reduce the rate of confrontations in the construction projects, it should not be portrayed as a panacea for all their ills.

1.2. Aims and Objectives
The high degree of confrontation in the construction industries is a common knowledge. Complex projects are more susceptible to litigations and claims for different reasons such as technical complexity, multiple interfaces, overlapping scope of works, etc. Should litigation happen in these projects, it will be both costly and hard to resolve. Lots of efforts have been made for reducing litigation in the industry, the practical evidence suggest that considerable amount of these efforts was in try for improving procurement strategies and contractual arrangements. However these efforts were not so successful.

Some scholars in different branches such as economics, law, management and recently complexity science question the efficiency of contract arrangements preventing claims.

The overall aim of the research is to identify the characteristics of a contract that can avoid (or reduce) dispute and claim in major construction projects. In the light of
pertinent contract theories and characteristics of major engineering and construction projects the following questions are relevant:

1. Define claim.
2. Describe how contract prevent litigation and claim.
3. Outline the situation in the studied projects and their difference from the global trends.

In order to cover the above mentioned areas the following research questions are raised:

1. What is the nature of claim, dispute and conflict?
2. What is the status of claim and dispute in the construction industries?
3. What is the role of the contract in the prevention of claims?
4. What are the main causes of claims in construction projects?
5. How can claims be tackled by drafting appropriate contracts?
6. What are the practitioners’ perceptions regarding claim?
7. Is there any difference between claim management in Iranian large scale projects and global trends?

1.3. Scope and Limitations
The cases and supporting information are mostly gathered from the projects in the Iranian oil, gas, and petrochemical sector which constructed between 1995 and 2008. All of these projects have government clients and therefore obtaining the information about them was associated with a great deal of difficulty. To tackle this problem the researcher has tried to combine different research methods to get a more complete picture of disputes which arise in such projects and practitioners’ attitudes towards them.

As most of the data has been gathered from Iran, it can be expected that national culture has affected the course of events. This is one of the basic definitions of culture after all. Therefore in the discussion section the findings have been discussed using the dimensions of the Iranian culture.
The researcher acknowledges that the findings of this research may not be extrapolated to other sectors of the construction industry.

1.4. Iranian Oil and Gas Industry

Iranians oil production began before that in any other country in the Persian Gulf region in 1908. The exploitation of Iranian oil was until 1951 in the hands of British owned Anglo-Iranian Oil Company (AIOC) now known as British Petroleum (BP). In 1951 oil was nationalised and subsequently the National Iranian Oil Company (NIOC) took over the oil industry.

Today the National NIOC controls estimated 132.5 billion barrels of oil and 296 trillion cubic meters of gas in proven reserves. These make Iran second in the world in production of the both oil and gas (International Petroleum Encyclopaedia, 2006).

Ranked in top three or two oil companies in the world, NIOC generated 46.9 Billion USD in export revenue in 2006. The company provides for 70% of the Iran’s total exports and 40% of the government’s budget.

The NIOC has three sister companies which all operate under the petroleum ministry but function as NIOC affiliates handling gas, petrochemicals and refining. Estimated number of the employees in these companies varies from 120,000 to 180,000 people. The NIOC is internally organised into many subsidiary companies. Five are in charge of management of oil fields in different geographical areas. Three subsidiaries are based overseas and are in charge of marketing and procurement. Others have functional expertise such as drilling, terminal operation, exploration and general contracting and engineering.

The low value added of refining and existence of world surplus of refining capacity has made petrochemical industry an area in which value of exports can be boosted. Therefore since 1973 investment in petrochemical industry forms the major part of the Iran five year development plans.

According to the last statistics Iran has produced 27.4 million tons of petrochemical products during the eight months of the current Iranian year started 20th March, 2012 (See http://www.shana.ir/199210-en.html).
Development and increasing production capacity in the Iranian petrochemical sector is continuing and according to the last five–year development plan in 2015 the annual production of some of the main petrochemical products should be as follow:

<table>
<thead>
<tr>
<th>Type of Product</th>
<th>Annual capacity (million ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>7.5</td>
</tr>
<tr>
<td>Ethylene</td>
<td>12</td>
</tr>
<tr>
<td>Polymers</td>
<td>10</td>
</tr>
<tr>
<td>Urea</td>
<td>8.5</td>
</tr>
<tr>
<td>Aromatics (BTX)</td>
<td>4</td>
</tr>
</tbody>
</table>

**1.5. Evolution of Research**

At the beginning of this research, the aim of the research was to search for a robust contract and innovative procurement strategy that can avoid the formation of claims and disputes in major construction projects. However, a detailed study of contract related theories showed that such a contract is not possible. Therefore, later on, the research concentrated on reducing claims in major construction projects, identification of major causes of claims in reality and tools and techniques which can limit them.

A holistic approach that looks at all aspects of the project from tendering to commissioning has been adopted and as expected many areas of uncertainty have been identified.

There was also an ontological problem with the research question. As there was no available data on projects that experienced no disputes and claims, the research has been focused on the only available dispute-free project, the famous Heathrow Terminal Five. A considerable amount of the secondary data is available on that project in various formats.
Meanwhile another research front has been opened to look at the claims and disputes in the major Iranian construction industry. So the research topic is better expressed as “reducing claim” rather than “avoiding claim”. Using case studies, questionnaires and interviews the nature of disputes and claims in Iranian oil, gas and petrochemical projects and people’s perception towards construction claims have been studied.

1.6. Outline of this Study
The rest of this research is structured as follows:

The second chapter deals with claim terminology, it defines claim, dispute and conflict based on the literature and compares and contrasts the term. Furthermore the chapter reviews causes of dispute in the construction industry as reflected in the literature.

The third chapter of this research discusses the theoretical foundations of contracts using principal agent theory, transaction cost economics and relational contracting. Despite their differences all three theories argue that a classic contract by itself is always incomplete and other non-contractual measures are required to preserve the bond between the parties.

The fourth chapter look at claim in projects from complexity perspective, and describes the control measures used in complex systems to re-arrange the relationships in complex systems after naturally occurred conflicts.

Chapter five deals with the methodology issue. At the beginning of the chapter research paradigms are discussed and the position of this research among all possible paradigms is set. Later, methods which have been used are briefly explained.

A huge amount of data exists about the Heathrow Terminal Five (T5) success on running a claimless project and its famous “T5 Agreement”. However, some borders on propaganda and much simply does not agree with the experience. Therefore, the sixth chapter reviews this project as a case study.
Chapter seven studies the effects of culture in people’s attitude toward dispute in general and dimensions of Iranian national and business culture in particular.

Chapter eight consists of presentations of data and discussion. This chapter consists of four sections which show different data that can be put together to present a picture of the causes of a problem in Iranian major construction projects. The first section consists of two case studies which are selected from the most problematic projects. As apparent in these cases, although contracts have a direct role in the formation of conflicts and deteriorate the relationship between the parties to breaking point, it hardly plays a role in dispute resolution. The second section is a questionnaire survey which was performed among project teams of major construction and engineering projects mainly in the oil, gas and petrochemical sector. The third section presents the outcomes of a series of semi-structured interviews with project managers, lawyers and commercial managers of petrochemical projects. The fourth and final section presents the list of claims that were raised in oil, gas and petrochemical projects between 1995 and 2005 and were referred to a central mediation office.

1.7. The Main Outcomes of the Research
The first case study involves Heathrow Terminal Five projects. Using transaction economic theory, the study shows that that sort of arrangement can be suitable only for certain projects with extremely high asset specificity. In this particular case the value of the project is a considerable portion of the client’s assets, therefore they could not transfer the risk of the project to the contractors at any price. In other words, failure of the project could be detrimental to the client.

The next two case studies are on petrochemical plants in Iran. They show that although a contract can initially cause disputes, it hardly plays a role in the resolution of a dispute. The high amount of locked-in investment (or asset specificity as transaction cost economists say) causes clients to seek a compromise and to try to resolve the dispute and complete the projects regardless of contractual clauses.
These cases also show types of claims and the value of different types of claims in large scale projects.

The research shows that almost all of these projects have been awarded as Engineering Procurement Construction (EPC or turnkey) or EP+C and the payments are on a lump sum basis that transfers all the risks to the contractor. The main causes of claim in these projects are identified as:

- Delay in completion.
- Cost overrun.
- Delay in payment (or non-payment).

Delays and cost overruns are common in all construction projects; however delay in payment has not been reported as a major problem in other researches.

A review of claim cases which have been referred to the central mediation office in the Iranian Ministry of Petroleum also shows that most of these claims are financial. The main causes of financial claims have been identified as:

- Delayed and overdue payments.
- Demanding interest for overdue payments.
- Requesting escalation for compensating an abrupt increase in the price of resources.

A literature review shows that drafting a perfect contract which can avoid all sorts of disputes is impossible, considering frequency of financial claim and their portion of the total value of claims, one can conclude that provision of clauses that reduce conflict can be a great improvement for Iranian large scale projects.

A set of interviews with project management teams in both client and contract organisations revealed some repetitive patterns of claim formation. Another point was that none of the interviewees have been personally involved in litigations. Both interviews and the following questionnaire survey indicate that practitioners have no confidence in the judicial system and believe that the courts are not efficient; however the World Bank’s annual report contradicts this idea. This discrepancy is justified using cultural dimensions of Iranian society.
A questionnaire survey has also been conducted to verify some of the findings of the interviews and confirms that practitioners give more credit to contractual measures than non-contractual ones.

Finally it has been concluded that although a contract cannot prevent claims in the projects, poorly drafted contracts can cause claim. The repetitive patterns in the studied projects confirm this idea.

Figure 1.1 The research flow diagram
CHAPTER TWO - CONFLICT, DISPUTE AND CLAIM

2.1. Introduction
This chapter starts with explaining claim terminology. Then it looks at dispute taxonomies in the literature. It continues with claim in the construction and studies the causes of claim in the industry. Repetitive causes of claim in the literature can be due to the low rate of learning in projects based organisation, this issue is briefly discussed. Finally the pathogen concept is introduced.

2.2. Terminology
Usually, terms related to the field of conflict and claims are used interchangeably. It is worth starting this chapter by taking a closer look at the definition of these words. The following definitions are provided by the Oxford Dictionary of Concise English:

- **Conflict**: fight; struggle; disagreement
- **Claim**: demand as one’s right; assert
- **Disagreement**: have a difference of opinion; fail to agree; quarrel
- **Dispute**: argue; debate; quarrel; question the truth or validity of

Minor differences between these terms indicate evolution of hostility from a simple difference in opinion to a full scale dispute, and these words can be used to define the continuum of dispute.

2.2.1. Dispute
Reid and Ellis (2007) argue that dispute has no definitive meaning and its existence is a subjective matter requiring a common sense approach which relies on facts, law and policy consideration. Ndekgri and Russell (2006) and Reid and Ellis (2007) refer to the Halki Principle (Case of *Halki Shipping Corporation vs Sopex Oils Ltd.*, 1981, 1 WLR CA) where a dispute does not exist until a claim has been submitted and rejected. In other words, a dispute is a situation in which a claim has been rejected wholly or partially, or it has been ignored by the other party. In reality distinguishing a claim from a dispute is not always that simple. In some cases the other party does not reject the claim and requests more information to support the claim. In such conditions the claimant cannot commence dispute resolution as per the contract because technically the dispute has not yet arisen (Gould et al, 1994).

Morgan (2008) mentions two different schools of thought, one that defines dispute as a short term disagreement which is relatively easy to resolve, and defines conflict as a deep-rooted problem resisting resolution. The other maintains that conflict exists in parties who have different interests, values, or needs. This conflict can be either latent or manifested, in which case it turns into a dispute.

Felstiner et al. (1980) suggest that all disputes go through a specific evolution cycle. They recognise different stages for dispute: naming, blaming, claiming and dispute.

- **Naming**: considering an experience as injurious and labelling the problem.
- **Blaming**: connecting the cause of problem to another person.
- **Claiming**: voicing complaints to the person believed to be responsible.
- **Dispute**: occurs when the other person either rejects the claim, partly or in whole, or ignores the claim.

The principles of their theory on manifestation of disputes are as follows:

- All disputes go through the aforementioned three stages before the dispute has clearly arisen.
• The stages are unstable and unclear. Dispute transformation is subjective and many external factors can influence it.

• The end result of the process is dispute, which is objective, and formed by rejection or ignoring a claim.

Psychology literature uses the term “conflict” for human interactions, using the same concept process for formation of a dispute can be distinguished from people’s behaviour in a conflict situation.

2.2.2. Conflict

A core issue of conflict is a condition in which ‘A’ completely understands what is expected from them, but rejects the line of conduct which ‘B’ requires. Furthermore ‘A’ is prepared to peruse both their own goals and the line of action by which they propose to achieve them (Rex, 1981). In a short definition conflict exists whenever incompatible activities occur (Deutsch, 1973). Pondy (1967) in a broader definition says that the term ‘conflict’ has been used in the literature in these contexts:

• Antecedent conditions of conflicting behaviour (such scarcity of resources or difference in the policies).

• Affective states such as stress, tension, anxiety, etc. of the individuals involved.

• Cognitive states of individuals i.e. their perception or awareness of a conflicting situation.

• Conflicting behaviours ranging from passive resistance to overt aggression.
<table>
<thead>
<tr>
<th>Scholar</th>
<th>Year</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coser</td>
<td>1956</td>
<td>Antagonistic struggle</td>
</tr>
<tr>
<td>March and Simon</td>
<td>1958</td>
<td>Breakdown in the standard mechanism of decision making.</td>
</tr>
<tr>
<td>Katz and Kahn</td>
<td>1966</td>
<td>Particular kind of interaction, marked by efforts at hindering compelling or injuring and by resistance or retaliation against those efforts.</td>
</tr>
<tr>
<td>Beals and Siegel</td>
<td>1966</td>
<td>Breaches in normally expected behaviours.</td>
</tr>
<tr>
<td>Walton</td>
<td>1966</td>
<td>Opposition process in several forms – competition, status rivalry, bargaining, sabotage, verbal abuse, etc.</td>
</tr>
<tr>
<td>Maerk</td>
<td>1966</td>
<td>A threat to cooperation.</td>
</tr>
<tr>
<td>Pondy</td>
<td>1967</td>
<td>A conflict episode can be thought of as a gradual escalation to state of disorder.</td>
</tr>
<tr>
<td>Schmidt and Kochan</td>
<td>1972</td>
<td>Overt behaviour arising out of process in which one unit seeks the advancement of its own interest in its relation with the others. This advancement must result from determined action not fortuitous circumstance.</td>
</tr>
<tr>
<td>Roloff</td>
<td>1987</td>
<td>When members engage in activities which are incompatible with those of others within their network, members of other collectivities, or unaffiliated individuals who utilise the services or product of the organisation.</td>
</tr>
<tr>
<td>Thomas</td>
<td>1992</td>
<td>A process which begins when one part perceives that another has frustrated, or is about to frustrate, some concerns of his.</td>
</tr>
<tr>
<td>Rahim</td>
<td>2002</td>
<td>Interactive process manifested in incompatibility, disagreement or dissonance within or between social entities.</td>
</tr>
<tr>
<td>Pena-Mora</td>
<td>2003</td>
<td>Any action or circumstance resulting from incompatible or opposing needs.</td>
</tr>
<tr>
<td>Barki and Harwick</td>
<td>2004</td>
<td>Dynamic process that occurs between interdependent parties as they experience negative emotional reactions to perceived disagreement and interference with the attainment of their goals.</td>
</tr>
<tr>
<td>Wilmot and Hocker</td>
<td>2005</td>
<td>An expressed struggle between at least two independent parties who perceive incompatible goals, scarce resources, and interference from others achieving those goals.</td>
</tr>
<tr>
<td>Hatch</td>
<td>2006</td>
<td>Struggle between two or more groups in an organisation centred on some states or conditions that favour one group over others and occur when the activities of one group are perceived as interfering with the outcomes or</td>
</tr>
</tbody>
</table>
Pondy (1967) also distinguishes three attributes related to each conflict as:

2. Conflict can ultimately affect the stability of an organisation.
3. Conflict can be either functional or dysfunctional.

He further proposes a five stage model for escalation of conflicts consisting of: latent conflict, perceived conflict, felt conflict, manifest conflict, and conflict aftermath.

1. Latent conflict

A long list can be provided for causes of organisational conflicts, however they can be categorised under three main headings: (1) competition for scarce resources; (2) drives for autonomy; (3) divergence of goals. Of course two or more causes of conflict can be present at the same time.

2. Perceived conflict

A perceived conflict can be an escalated form of a latent conflict or not. If not, it is the result of a misunderstanding of the other party’s true position. Effective communication between the parties can stop the development of latent conflict to this stage. Many complex oil contracts include clauses that require parties to suppress the conflict temporarily in order to guarantee progress of the project (Valaaand and Hakansson, 2000).

3. Felt conflict

In this stage the conflict becomes personalised. Pondy believes that the whole personality of people is involved in the conflict at this stage. It has often been observed between the managers who represent their organisations in contractual battles which tremendously increase the level of pressure on the people (Valaaand and Hakansson, 2000).
4. Manifest conflict

In this stage one or more of the varieties of conflicting behaviours occur. Pondy explains that an act is considered conflicting if, and only if, one of the participants perceives it as conflicting. In a complex project it can be said that conflict took a formal shape at this stage.

5. Conflict aftermath

Development of each of the conflict episodes is a function of effects from previous conflicts and environmental situations. It means that the outcome of a particular conflict can affect other conflicts in the same project or other projects. Figure 2.1 shows how conflict aftermath can affect the development of upcoming conflicts.

![Figure 2.1 The dynamic of conflict episode (source: Pondy, 1967)]
Literature discusses conflict on five different levels as follows:

1. **Personal**: when the conflict is within a person.

2. **Person-role**: when there is a conflict between personal values and role requirements.

3. **Inter-sender**: when different requirements of a role cannot be met at the same time.

4. **Inter-role**: when an individual plays more than one role i.e. a mother and a manager and finds some demands of these roles conflicting.

5. **Inter-personal**: when a person enters into a conflict with others. This is the type of conflict we discuss in this research, however it can be extrapolated from inter-personal to inter-organisational conflicts.

Wall and Callister (1995) divide conflict characteristics into three main groups: (1) **Individual;** (2) **Interpersonal;** (3) **Issue.**

**Individual Characteristics**

The effect of personality in an arising conflict is a controversial issue. Thompson (1990) and Wall (1991) state that personality has no role in negotiation. Later on Wall extrapolated it into the conflict area and concludes that personality has a minor effect on conflict. However, Baron (1990) believes that people with type A personality are more likely to engage in a conflict than people with type B personality. According to Glass (1977) as sited by Baron type A persons are impatient, highly competitive, and hostile in their dealing with others, while type B persons are sensitive to their effect on others, and are able to adjust their behaviour to each situation they encounter. A combination of sensitivity and
flexibility make it less likely for people in the second group to be involved in a conflict.

Oetzel and Ting-Toomey (2003), Augsburger (1992) and Hahm (1986) among others note that different cultures value conflict differently. While in most western cultures conflict is seen as a part of business, or even the most beneficial part of business; others especially in the Far East and Middle East feel bad about conflict and try to avoid it. This mentality can be the cause of a relatively lower number of conflicts in the east.

Tjosvold and Lee (1999) maintain that some people aim to create conflict; these people will usually be engaged in one. Also Pruitt and Rubin (2003) argue that when people set a very high target for themselves they are more likely to be engaged in conflict.

In addition, Evans’s study (1987) in organisational behaviour showed that, a desire for autonomy by an individual, or organisation when another party seeks interdependence is a source of conflict.

**Interpersonal Characteristics**

**Perceptual interface**

A major cause of conflict can be the perception that the other party has a high goal (Pruitt and Rubin, 2003). It usually deteriorates relationships because one party assumes that his counterpart’s achievement will be at his cost.

**Communication**

Communication plays a double role in relation to conflict. According to Pondy (1967) a low level of communication can lead to misperceptions and misunderstandings and lead to conflict. However, extensive communication can also be a source of conflict (Putnam and Poole, 1987). Communication misunderstandings increase in situations in which parties dislike or hate each other
or have a history of previous confrontation (Wall and Callister, 1995). Baron (1990) expresses that accurate communication can cause conflict only if it contains criticism.

**Behaviour**

If a party has a feeling that his counterpart blocked his aims or acted in a way which reduces his outcome, there is a very good reason for initiation of conflict (Alter, 1990). Likewise reducing one’s power by another can cause conflict (Ferguson and Cooper, 1987).

**Structure**

Any relationship follows a set of norms, laws, costumes, contracts, etc. Power imbalance in the relationship can be a main cause of conflict. It usually happens when the weaker party resist the stronger party’s influence, or when he seeks a way to increase his own authority (Peterson, 1983). Structure also creates interdependency between (or among) the parties. These interdependencies can restrict or redirect party’s aims, behaviour and outcomes and lead to formation of a conflict. Presence of diverse goals in an interdependent structure increases the possibility of raising conflict (Thomas, 1976; Putnam and Wilson, 1982). When the structure establishes a distributive power and one’s gain comes at the expense of the other(s), formation of the conflict is almost inevitable (Walton and Dutton, 1966 and 1969). If a structure can super-ordinate the goals, strengthen the binds and create collaborative incentives it will prevent conflict (Nelson, 1989 and Thomas, 1992).

**Issues**

Conflict happens more frequently in complex issues or multiple issues. This is usually because divergence in interests and misunderstandings are more likely to happen in them. However, it must be noted that sometimes the same characteristics make complex conflict easier to resolve.
After formation of a conflict, multiple issues provide the opportunity for a trade off between the parties and gives them the chance to resolve the issue in a face saving manner. In the same way, complex issues can be divided into a number of simple issues which can be traded (Wall and Callister, 1995).

McKenna (2006) distinguishes different perspectives of conflict as:

- Unitary perspective: This is the earliest perception of conflict. It defines conflict as a harmful process which must be avoided. Mayo et al (1949) describe conflict as a negative phenomenon which is caused by a lack of communication, lack of openness and trust, and inability of superiors to meet the needs of subordinates. Many authors such as Fox (1974) refer to the main idea of unitary scholars as “conflict as an abnormal and dysfunctional phenomenon”.

- Pluralist perspective: A later school of thought accepts conflict as a reality and natural phenomenon and believes that conflicts can sometimes be beneficial. According to the pluralist view conflict can be resolved when a realistic meeting of minds take place, which is beneficial to all those who are involved in the conflict.

- Interactions perspective: This is the current school of thought which believes that a minimum amount of conflict is necessary in organisations to ensure the viability of relationships and at the same time encourage creativity and innovation.

2.2.2.1. Taxonomies of Conflicts

Functional vs. Dysfunctional conflict

Scholars such as Gadde and Hakansson (1993), Jehn (1995), Wall et al. (1995) and McKenna (2006) distinguish between functional and dysfunctional conflicts.
**Functional (or constructive) conflict** is described as ‘a low to moderate level of subtle and controlled opposition, which is likely to lead to an arousal of motivation’ (McKenna, 2006). Functional conflicts are more likely to be seen in project based organisations than process based ones (Jehn, 1995). Perlow (2003) supports this argument when he expresses that reasonable people who make complicated decisions in conditions of uncertainty are bound to have differences in opinion which ultimately lead to “acceptable conflicts”. These conflicts widen the horizons, create insight and can help make better decisions.

**Dysfunctional (or destructive) conflict** produces uncontrolled opposition and discontent. It restricts communication, undermines cohesiveness, and elevates fighting between the people involved to a level higher than achievement of the mutual goal and ultimately decreases the effectiveness. In the extreme form it can even disrupt the relationship between the parties (McKenna, 2006). Amason (1996) emphasises that the line between functional and dysfunctional conflicts are not always clear. Whitfield (1994) declares that:

“Unfortunately very few people can separate functional and dysfunctional conflicts as and when they arise. The categorization of conflict into functional and dysfunctional is almost inevitably done retrospectively. So, in practical terms we have no choice. We have to manage every conflict whether it turns out to be functional or dysfunctional, from the outset.”

Morgan (2008) divides disputes into “latent” and “emerging” groups. He explains that latent dispute can arise at the start of the relationship, even at the contracting stage, when one of the parties has an issue which bothers them but they do not find the issue significant enough to raise it at the time. A “trigger event” can always turn a latent dispute into an emerging one. If no trigger ever happens or if a subordinate party (parties) does not feel disadvantaged by the relationship (i.e. the contract), the dispute may remain latent and never develop into an emerging one.

Guetzkow and Gyr (1954) divide conflicts into two groups: “substantive conflicts” and “affect conflicts”. They explain that in substantive conflicts people are task
oriented and try to find a solution for their problem, while in affect conflicts people try to satisfy their personal oriented needs using the conflict.

Similarly, Pinkely (1990) and Jehn (1997) divide conflicts into “task” and “relational” groups. Likewise Amason et al. (1996) divide conflict into two groups: “C type” or cognitive type and “A type” or affective type. Cognitive conflicts are more related to concrete issues which can be dealt with on an intellectual level, while affective types relate to subjective issues and can be dealt via emotional matters.

All these classifications somehow try to distinguish between beneficial and non beneficial conflict.

At the same time some other scholars reject all positive effects of conflict. For instance De Dreu and Weingarts (2003) express that any type of conflict is detrimental to information processing as it inhibits task performance, and that task and relationship conflict both negatively affect team performance.

Gadde and Hakansson (1993) use a two dimensional scale to explain the dual effect of conflict in the organisation. They show the degree of conflict on the horizontal axis and the degree of collaboration on the vertical axis (see figure 2.2).

Figure 2.2 Gadde and Hakansson model for different types of conflict (Source: Gadde and Hakansson, 1993)
As the model shows, a low amount of conflict can cause a marginal relationship in which none of the parties benefit, or it can cause a “nice” relationship in which an efficient transaction exists and proper mechanisms for handling disputes are developed. With a high degree of conflict and low collaboration, efficiency is seriously challenged, while in a high degree of conflict and high degree of collaboration, a relationship will be well developed.

Thomas and Kilmann (1974) propose a model for a people’s approach to conflict situations. The horizontal axis of their model shows “cooperativeness” which is the degree to which one is willing to help the other party in reaching his goal. The vertical axis of the model is “assertiveness” which is the degree to which one seeks to meet one’s own target. In their model one has five positions to take in any conflict as follows:

1. **Avoiding** which is getting away from the conflict. People who chose this position are more concerned about getting away from the trouble rather than anybody’s interest.

2. **Accommodating** which is paying attention to another party’s interest, and sacrificing your own interest to please the other party.

3. **Compromise** which has to do with give and take and tries to find a middle ground solution in which some interests are met and some are given up by either party.

4. **Competition** which is about getting the best outcome for oneself. This is a win/lose situation and each party tries to win.

5. **Collaboration** which is about helping each other to gain the optimum outcome so that both interests are met.
2.2.2.2. The Conflict Continuum

Tucker (1984) believes that conflict varies on a continuum between total conflict and total cooperation whereby neither of them is desirable. While total conflict leads to total chaos and destruction of a relationship, total cooperation means there is no competitive pressure to derive organisational advancement and progress or cause improvement. Such conditions can cause stagnation in organisations.

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Figure 2.3 Thomas and Kilmann model (Source: Thomas, 1992)

Figure 2.4 Conflict continuums (source: Tucker, 1984)
He defines different points on the continuum as follows:

**Collaboration:** When competing individuals or units cooperate for mutual advancement. Both are committed to the goal and both make concessions.

**Friendly conflict:** A low level of conflict which stimulates competition.

**Controlled conflict:** When resolution of the conflict seems impossible; however the parties in the conflict can continue their relationship.

**Total conflict:** A fully developed conflict which if not resolved can evolve into total chaos and termination of the relationship.

Moore (1986) also presents a conflict continuum which ranges from dispute avoidance to violence (see figure 2.5).

![Conflict continuum](Image)

**Figure 2.5 Conflict continuaums (Source: Moore, 1986)**

Morgan (2008) believes that as a dispute develops and extends during a time span there is a good chance for it to be escalated. He defines escalation as an ‘increase in the intensity of dispute’ and comments that in an escalation process five main changes happen to dispute as follows:

1. Parties shift from light tactics such as promise, persuasion and compromise to heavy tactics such as threat and power play.

2. The number of issues in the dispute increases.

3. Issues change from specific to general, and the relationship between the parties deteriorates.
4. Other people get involved in the dispute and the number of players increases.

5. The goal changes from reaching a mutually accepted solution to winning at any cost.

2.2.3. Conflict in the construction industry

The construction industry is notoriously known for being fragmented, adversarial and inefficient. These days, dealing with disputes and claims are among the necessary skills of project managers. In the construction industry claims are often referred to as “a way of life” (Barrie and Paulson 1992; Latham 1994), “inevitable and an indispensible part of a modern contract system” (Langford, 1987; Ren, 2001).

Several industry reports raised concerns over a disputes and claims “epidemic”. Fenn (2002) lists some of the reports published on construction after World War Two. The repeating theme of all these reports is that construction contracts can go wrong; disputes can be preponderate and an adversarial attitude is evident. Table 2.2 lists some of these reports.

During the past decades the construction industry professionals, more than ever, used legal assistants to identify, allocate, control and minimise risks associated with construction projects. However, the industry faces an abrupt increase in the number of claims and disputes. This rise in the number of claims has “lawyerised” the industry (Hanna, 2007 and Owers et al., 2007).

Hanna (2007) identifies the main causes of the rise in the number of claims as:

1. Decreased quality of design drawings. In many cases there are discrepancies between contract documents. These discrepancies are identified during the execution and are needed to be resolved by verifications. Moreover many contracts are ambiguous in their intent or are not complete, which will cause dispute between the parties during the project.
2. Increased use of disclaimer clauses. New contracts contain many disclaimer clauses that try to deny responsibility for accuracy and sufficiency of the provided information.

3. Shortened construction duration. Owners and developers are usually concerned for shortening time to market and positive project cash flow. The use of fast tracking has been increased and as a result bids are usually prepared based on insufficient and inaccurate information, schedules are usually unrealistic and stacking of trades are usually necessary.

4. Increased risk. In today’s highly competitive market the average of a contractor’s margin is 2 to 3 percent. Such an environment precludes a contractor from foreseeing contingencies for items like delay, problems with design and change orders. Therefore contractors have to keep the record of the changes and reworks during the project and then ask for extra payment for compensation of their costs.

Morledge et al. (2009) argue that increased fragmentation has increased transaction volumes at lower average values and consequently higher levels of opportunism. They also describe the current situation of the industry as “less trusting and more self-interested and adversarial than before”.

Groton (1994) developed a five step model for construction disputes as:

1. A problem
2. A disagreement
3. A dispute
4. A conflict
5. Litigation
<table>
<thead>
<tr>
<th>Year</th>
<th>Report Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1944</td>
<td>Report on Management and Placing of Contracts (the Simon Report)</td>
</tr>
<tr>
<td>1949</td>
<td>American and British Productivity Council</td>
</tr>
<tr>
<td>1964</td>
<td>The Placing and Management of Contracts for Building and Civil Engineering Works</td>
</tr>
<tr>
<td>1965</td>
<td>Higgins &amp; Jessop, Communication in the Building Industry</td>
</tr>
<tr>
<td>1975</td>
<td>The Public Client and the Construction Industry (the Wood Report)</td>
</tr>
<tr>
<td>1980s</td>
<td>Faster Building for Commerce/Industry</td>
</tr>
<tr>
<td>1992</td>
<td>The Building Employer’s Confederation, Building Toward 2001</td>
</tr>
<tr>
<td>1994</td>
<td>Sir Michael Latham, Constructing the Team - Final Report (Latham Report)</td>
</tr>
<tr>
<td>2001</td>
<td>Modernizing Construction: The National Audit Office</td>
</tr>
</tbody>
</table>
At the first glance the model may look quite different from Felstiner’s model however they both emphasise the objective nature of dispute and escalation of the events. While Felstiner focuses on requirements for formation of a dispute (a name for a complaint and a person to blame) Groton builds his model on escalation of a dispute from a site problem to a formal litigation which involves top management of organisations (Gould et al, 1999).

Groton also adopts Gulliver’s (1973) distinction between disagreement and dispute in which project stakeholders usually have a positive approach towards the ‘problem’ during disagreement, and try to find a solution for it. However, in a dispute the attitudes are more pessimistic, polarised and entrenched.

It must also be noted that Groton placed conflict further than dispute in the escalation path; it implies that involvement of human factors in conflict can fuel a problem over a rejected claim (dispute).

2.2.3. Claim

Another concept that needs more attention in the context of the construction industry is “claim”. The term “construction claim” is generally used to describe any application by the contractor for payment that arises beside the ordinary payment provisions of contract (Jergeas and Hartman, 1994). Claim must be considered as a tool for a contractor to seek more time or money. Diekmann and Nelson (1985) define claims as ‘the seeking of consideration or change (to contract terms) or both, by one of the parties to a contract based on an implied or expressed provision.’

Howell and Mitroupulos (2001) identify three basic factors that cause disputes:

- High degree of uncertainty in complex projects.
- Imperfect contracts in which future problems have not been predicted.
- Opportunistic behaviour of parties who try to take advantages from each other in the competitive market.

Groton (1994) suggests that the main sources of dispute are:
- Project Uncertainty: Uncertainty arising from an existing condition, outside forces and the complexity which cause change beyond the expectation of project parties.

- Process Problems: Problems in the contracting process including contracts, incomplete scope definition, unrealistic expectation regarding time and cost of a project, and poor performance in the execution of the job.

- People issues: Issues and problems arising between people as a consequence of poor interpersonal skills, poor communication, lack of responsiveness and unethical or opportunistic behaviours.

Gould et al (1999) conduct research on the main causes of dispute in the construction industry and identify the main causes as:

- Lack of experience by the architect, engineer or lead consultant: Lack of experience can lead to mistakes in design, estimates, programming and budgeting and can be the cause of dispute with the owner and contractor.

- Lead consultant employed by the owner: It is popular for the owners to use their staff as architects or lead consultants of a project. In such conditions the lead engineer may be able to work impartially but they can hardly be independent. In such a case the engineer knows that at the end of a project they will be transferred to the employer’s organisation and the satisfaction of the employer may lead to their promotion while dissatisfaction may cost them their job. It will put the lead engineer in a difficult position and can influence their decision regarding contractor’s claims and final payments and cause further disputes between themselves and the contractor.

- Competitive tendering: Most of the projects are awarded on a competitive basis to the contractor who offers the lowest price; some contractors bid a low price and try to increase their profit margin by claiming during the project execution. This attitude is one of the major sources of disputes during the construction phase.
Diekmann (1994) states that people, processes and products are the three main sources of disputes in construction. Herald (1987) points out that construction disputes are the opposition of interests, values and objectives. Splitter (1992) supports the same idea and says that a construction dispute is compared with the different perspectives, interests and agendas of human beings. Sykes (1996) adds that a dispute is a result of unrealistic expectations, lack of team spirit and misunderstanding. The studies mentioned so far suggest that conflict is a prime driver of dispute.

The other area which has been investigated by many researchers is the subject of disputes in the construction industry. Hewit (1991) identified six types of construction disputes: (1) change of scope; (2) change conditions; (3) delay; (4) disruption; (5) acceleration; (6) termination. Based on a review of cases Heath (1994) recognised seven main types of construction disputes: (1) contract terms; (2) payment; (3) variation; (4) extension of time; (5) nomination; (6) re-nomination; (7) availability of information. Sheridan (2003) conducted a survey on disputes settled by adjudication and categorised them into three main groups: (1) valuation of changes; (2) valuation of final account; (3) failure to comply with payment provision.

Mitropolous (2001) suggested a model to show development of disputes in the construction industry. The model applied Williamson’s framework which combined the effect of project uncertainty; contractual problems; working relations and problem solving effectiveness on the development of disputes and explained how the combination of behavioural and environmental factors can lead to a contractual problem. Finally, he identified major factors which can describe the formation of a dispute as: project uncertainty, contractual problems and opportunistic behaviours.

In a more recent study, Cheung and Wing Yiu (2006) suggest that constructional disputes can be conceptualised as having three basic components: contract provision, triggering event and conflict. They show that this conceptualisation fits well with the fault tree framework which is used to evaluate system failure. They used a fuzzy failure tree model to calculate the probability of dispute occurrence in
a complex design and build project and concluded that the likelihood is 0.997 to 1. This means that disputes are inevitable in this type of project.

Australian Construction Services (1998) which studied more than 90 construction related organisations in more than 16 countries concluded that ‘the greatest cause of claim and dispute in the construction industry is related to the problems in contract documentation, including errors contradiction, ambiguity and the late supply of documents, which gives rise to delay and inefficiencies and hence claims’.

Easton (1989), Kartam (1999) and European Construction Institute (ECI) (1996) propose a six stage model for the claim process as follows:

1. Claim identification
2. Claim notification
3. Claim examination
4. Claim documentation
5. Claim presentation
6. Claim negotiation

Baki (1999) states that a successful contractor should be prepared for three scenarios regarding claim as follows:

1. Claim prevention
2. Claim presentation
3. Claim defence

2.2.3.1. Types of Claim
Kumaraswamy (1997) maintains that construction claims can be based on the contract itself, a breach of contract, a breach of some other common law duty, a
quasi-contractual assertion for reasonable compensation (quantum merit), or an ex-gratia settlement request.

Similarly Merna & Bower (1992) divide construction claims into three main categories as follows:

1. Contractual claims: These are based on a specific clause in the contract. In such claims the claimant may be entitled to an additional payment; or the contractor may claim for entitlement to additional time (time extension) without any liability regarding liquidated damage.

2. Common law claims: These are related to damages for breach of contract, tort, repudiation, implied terms, etc. The pertinent contract clause to such matters is usually “Without prejudice to any other rights and remedies”.

3. Ex-contractual claims: Known also as ex-gratia claims, these are claims which have no contractual basis and usually represent compensation paid to the contractor on grounds of hardship, sympathy or fair-play.

In a study on FIDIC forms of contract Bunni (2005) distinguishes different types of claim as:

1. A claim under the contract, which can be in two different forms as follows:

   a) A specified event under the contract, which might or might not happen, where under certain conditions the contractor or the client is entitled to claim a designated remedy.

   b) A specific event which might be a breach of a particular provision of the contract entitling the claimant to a designated remedy.
### Table 2.3 Definition of claim in the literature

<table>
<thead>
<tr>
<th>Scholar</th>
<th>Date</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seelay</td>
<td>1997</td>
<td>A request by a contractor to recompense for some loss or expense that has suffered or an attempt to avoid the requirement to pay the liquidated and ascertained damage.</td>
</tr>
<tr>
<td>Baki</td>
<td>2001</td>
<td>Claim is usually initiated only after a contractor perceives that he/she has been wronged in some way, either by losing money or productive time.</td>
</tr>
<tr>
<td>McCaffer</td>
<td>2001</td>
<td>Claims arise when one party in the contract has suffered a detriment for which that party should be compensated by the other party.</td>
</tr>
<tr>
<td>Bartsch and Jergeas</td>
<td>2000</td>
<td>A request for additional compensation due to damage or expenses incurred during the performance of a construction contract.</td>
</tr>
<tr>
<td>Kartam</td>
<td>1999</td>
<td>A request for additional compensation due to damage or expenses incurred during the performance of a construction contract.</td>
</tr>
<tr>
<td>Diekmann and Nelson</td>
<td>1985</td>
<td>Seeking of consideration or change (to contract terms) or both, by one of the parties to contract based on an implied or expressed provision.</td>
</tr>
<tr>
<td>Powell-Smith &amp;</td>
<td>1993</td>
<td>General term for assertion of a right to money, property or remedy.</td>
</tr>
<tr>
<td>Stephenson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartman &amp; Jergeas</td>
<td></td>
<td>A request for compensation for damage incurred by any party in the contract.</td>
</tr>
<tr>
<td>Adrian</td>
<td>1988</td>
<td>A request by a construction party to another party for compensation over and above the agreed-upon contract amount for additional works or damages that may have resulted from events that were not included in the initial contract.</td>
</tr>
</tbody>
</table>

2. A claim arising out of or in connection with the contract. Here the remedy is not designated under the contract and the claimant needs to refer to a provision to the applicable law for obtaining a remedy.
3. A claim under the principles of the applicable law. This is usually a claim under the law of tort.

4. A claim arising out of the principle of quantum meruit. This is the situation in which there is no contract between the parties, or if there is a contract it is deemed to be void. This type of claim is based on the principle that any individual deserves to be reasonably paid for the work done. This principle also applies to cases when there is a contract but the price is not set.

5. A claim for an ex-gratia payment. These types of claims have no contractual base, but sometimes clients or engineers accept them as a matter of experience to avoid arbitration and litigation and to maintain goodwill in order to complete the project successfully.

2.2.3.2 Causes of claims in construction

Bartsch and Jergeas (2000) divide causes of claim into two main groups as follows:

1. Misunderstanding of contract intentions
2. Owner’s desire to reduce cost

Kumaraswamy (1997) explains correlation between conflict claim and dispute using the model shown in figure 2.6. Using the Halki principle; he argues that claim is necessary to accommodate unforeseen changes in project conditions. Levin (1998) considers claim as an administrative process for managing construction events that take place where contracts “leave off”, for instance changed conditions, design changes, defective specifications, variations in quantities, etc. While such claims can be resolved in friendly ways, presence of prior conflicts between the parties may initiate an unnecessary dispute.
Fenn (2002) argues that most of the literature on causes of claim suffer from lack of the philosophical aspects of cause and causation. Most of the researchers claim cause and effect without the required backup. They usually provide some statistical calculations but little discussion between the statistical findings and causes found. Fenn finds Diekmann’s assertion the closest to reality that “surveys cannot usually show the causation, only indicate associations and correlation.”

As Love et al. (2010) maintain that research on causes of dispute and claim in construction has already reached its saturation point. However, although the same causes are identified, it is unclear why disputes continue to manifest in projects.

Figure 2.6 Basic relationships between conflict claim and dispute (source: Kumaraswamy, 1997)
Table 2.4 Contributing to claims and disputes

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Author(s)</th>
<th>Date</th>
<th>Factors contributed to claim or dispute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hewitt</td>
<td>1991</td>
<td>(1) Change of scope; (2) Change of conditions; (3) Delay; (4) Disruption; (5) Acceleration; (6) Termination.</td>
</tr>
<tr>
<td>2</td>
<td>Watta &amp; Scrivener</td>
<td>1992</td>
<td>Most frequent sources of claims: (1) Variations; (2) Negligence in tort; (3) Delays.</td>
</tr>
<tr>
<td>3</td>
<td>Diekman et al.</td>
<td>1994</td>
<td>Three Main Dispute Areas: (1) Project Uncertainties; (2) Process problems; (3) People issues.</td>
</tr>
<tr>
<td>4</td>
<td>Heath et al.</td>
<td>1994</td>
<td>Common claim categories: (1) Extension of time; (2) Variation in quantities; (3) Variation in specifications; (4) Drawing changes; (5) Others. Main Types of Dispute: (1) Contract terms; (2) Payments; (3) Variations; (4) Extension of time; (5) Nomination; (6) Re-Nomination; (7) Availability of information.</td>
</tr>
<tr>
<td>5</td>
<td>Rhyes and Jones</td>
<td>1994</td>
<td>Factors Which Develop Disputes: (1) Poor management; (2) Adversarial culture (3) Poor communications; (4) Inadequate design; (5) Economic environment; (6) Unrealistic tendering; (7) Influence of lawyers; (8) Unrealistic client expectations; (9) Inadequate contract drafting; (10) Poor workmanship.</td>
</tr>
<tr>
<td>6</td>
<td>Semple et al.</td>
<td>1994</td>
<td>Common Categories of Disputes and Claims: (1) Premium time; (2) Equipment costs; (3) Financing costs; (4) Loss of revenue; (5) Loss of productivity; (6) Site overheads. Common Causes of Claim: (1) Acceleration; (2) Restricted access; (3) Weather conditions; (4) Increase in scope.</td>
</tr>
<tr>
<td>7</td>
<td>Bristow &amp; Vasilopoulos</td>
<td>1995</td>
<td>Primary Causes of Claim: (1) Unrealistic expectations of parties; (2) Ambiguous contract documents; (3) Poor communication between project participants; (4) Lack of team spirit; (5) Failure of participants to deal promptly with changes.</td>
</tr>
<tr>
<td>8</td>
<td>Conlin et al.</td>
<td>1996</td>
<td>Key Dispute Areas: (1) Payment and budget; (2) Performance; (3) Delay and time; (3) Negligence; (5) Quality; (6) Administration.</td>
</tr>
<tr>
<td>9</td>
<td>Sykes</td>
<td>1996</td>
<td>Major Groupings of Claims and Disputes: (1) Misunderstandings; (2) Unpredictability.</td>
</tr>
<tr>
<td>10</td>
<td>Kumaraswamy</td>
<td>1997</td>
<td>Common Claim Categories: (1) Variation due to site condition; (2) Variation due to client changes; (3) Variation due to design errors; (4) Unforeseen ground condition; (5) Ambiguities in contract documents. Common causes of claim: (1) Inaccurate design information; (1) Slow client response to decision; (3) Poor communication; (4) Unrealistic time targets; (5)</td>
</tr>
<tr>
<td>11</td>
<td>Mitropoulos and Howell</td>
<td>2001</td>
<td>Factors Which Develop Disputes: (1) Project uncertainty; (2) Contractual problems; (3) Opportunistic behaviours.</td>
</tr>
<tr>
<td>12</td>
<td>Yates and Hardcastle</td>
<td>2002</td>
<td>The main types of claim: (1) Claim for extension of time – time claim; (2) Claim for loss and expenses – money claims; (3) Variation claims.</td>
</tr>
<tr>
<td>13</td>
<td>Killian</td>
<td>2003</td>
<td>(1) Project management procedures: change order; pre-award design review; quality assurance; (2) Design errors: errors in drawings and specifications; (3) Contracting officer: knowledge of local statute, faulty negotiation procedures, scheduling, bid review; (3) Contracting procedures: contract familiarity, client contracting procedures; (4) Bid development errors: estimating errors.</td>
</tr>
<tr>
<td>14</td>
<td>Blake Dawson &amp; Waldron</td>
<td>2006</td>
<td>(1) Variation in scope; (2) contract interpretation; (3) extension of time claims; (4) site condition; (5) late or incomplete information; (6) obtaining approvals; (7) site access; (8) quality of design; (9) availability of resources.</td>
</tr>
<tr>
<td>15</td>
<td>Zaneldin et al.</td>
<td>2006</td>
<td>The most frequent types of claim: (1) Changes claims; (2) Extra-work claims; (3) Delay claims; (4) Different site condition claims; (5) Acceleration claims; (6) Contract ambiguity claims.</td>
</tr>
</tbody>
</table>
2.3. Learning in projects
A review of the literature on knowledge management and organisational learning shows that despite the importance of learning in project based organisations in general and construction projects in particular, the level of learning is relatively low (for instance see Schindler and Eppler, 2003; Kransdorff, 1996; Dikmen et al., 2008 and Aramo and Vanharanta, 2009). They diagnosed a kind of “project amnesia” (i.e. not retaining project insights) and correlate this phenomenon with some characteristics of the construction industry:

1. Temporary structure of projects
The impermanent structure of the project highly increases the risk of knowledge loss (Schindler and Eppler, 2003). By completion of the project, a project team will consist of adjourned people who were engaged in the project team and will be transferred to their line units or other different projects with all their experience, and these experiences and information can only be obtained via informal networking (Argyris, 1999).

According to Schindler and Eppler (2003), experiences and lessons learned are not usually well documented in the projects. This can be due to conflicting aims between the project and organisation. Project management teams usually look as far as the target date of their project whereas the organisation (at top management level) should consider their strategic plan, tools and techniques which can help them to be achieved.

2. Unique nature of projects
The main difference between a process and project is uniqueness of the project (see the PMI definition of the project). This non-routineness of the project can influence learning in the project. However as Cooper (2002) emphasises considering any new project totally different is a ‘misguiding belief’.
Sanvido and Medeiros (1990) cited by Mulholland and Christian (1999) express that uniqueness of the project, which is a main characteristic of the project, can cause old records to be considered of low value.

3. Inter disciplinary function of projects

Project teams usually consist of a group of people with different backgrounds who work together for the duration of the project and they will join their line unit or different projects after completion of the project.

Scarborough et al. (2004) point out that the difference between project organisation and that of the parent organisation may enhance innovation and change but at the same time will hinder flow of information between the two organisations.

Cooper (2002) points to difficulties in determining true causes of project performance as a hindering factor in the learning process, and points out that in a complex project ‘even if we specify enough time and ask the project manager what they have learned during the project, do we really believe that they can identify what has worked?’

2.4. Pathogens

According to Love et al. (2008) dispute in construction projects are due to latent conditions which inherently exist in construction projects. Reason (1990) makes an analogy with the development of diseases in natural organisms and calls the latent conditions which can cause error “pathogens”. In the context of project management, pathogens are latent conditions which lay inactive in the project system until a problem comes to light. As long as these pathogens do not become an actual dispute they tend to reside in the system unnoticed (Busby and Hughes, 2004 and Love et al., 2009). Pathogens usually have a long incubation period and therefore it is highly possible that they become an integrated part of a procedure. People may even repeat them in future projects, and that will cause the same error.
(or dispute) to be repeated in all the projects (Busby and Hughes, 2004). However once they coincide with “active failures” the problem arises and may cause significant damage. Reason (2000) defines active failures as a misconduct of people in direct contact with the system which can have different forms such as slips, lapses, fumbles, mistakes or procedural violations.

Busby and Hughes (2004) distinguish pathogens with some characteristics as follows:

- They are stable phenomena that have been existent in the system for a considerable time before the occurrence of the dispute.
- Before the dispute happened, they would not have been seen as an obvious stage in an identifiable sequence of failure.
- They are directly connected to the dispute, and are considered principal causes of dispute when it happens.

They also categorised pathogens as:

1. Practice: Pathogens arising from people’s routine practices.
2. Task: Pathogens arising from the nature of the task being performed.
3. Circumstances: Pathogens arising from the circumstances or environment in which the project is being performed.
4. Organisation: Pathogens arising from organisational structure or operation.
5. System: Pathogens arising from the organisational system.
6. Industry: Pathogens arising from the characteristics of the industry.
7. Tool: Pathogens arising from the technical characteristics of the tools.

Reason (2000) as well as Love et al. (2009) believes that latent conditions unlike active failures can be identified before the dispute event happens.
To explain how active failures and pathogens interact together Reason (2000) proposed the Swiss cheese model (see figure 2.7). He explains that complex systems rely on different layers of protection against errors, some of them are engineered, some are reliant on people and some are reliant on procedure and administrative controls. These different layers can protect the system most of the time, but there are always cases where they fail.

Ideally each defensive layer is intact and able to protect the system, however in reality they are like slices of Swiss cheese with many holes. The presence of a hole in a particular slice does not usually cause any problem. The problems occur when the holes line up in a way that allows the accident trajectory the opportunity to come into hazardous contact with the system.

The Swiss cheese model (as shown in figure 2.7) describes the formation of claims in the construction industry very well, as different types of pathogens enter projects over a very wide time span. Pathogens can arise in a project by routine practice from people and companies, prevailing rules and regulations, tender documents, contractual clauses, technical issues, market and economic situations, etc. However it seems that the contract is the layer which both parties actively play role in the formation of and it can be drafted in a way that covers other deficiencies. After all, as Von Branconi and Loch (2004) maintain, it is a contract that shapes the project culture and behaviour of the parties in the project. Therefore it has been believed for a number of years that a well drafted contract can protect the parties in the project against disputes and litigations during the course of the project. There are also other schools of thought which believe that contracts intrinsically contain a number of pathogens which if they coincide with an active failure can cause claim and dispute. Chapter three will discuss these two schools of thoughts and sufficiency of the contract for dispute prevention in more detail.
2.5. Summary
Different terms which are sometimes used interchangeably in relation with construction claim are defined using the literature. Types of conflict and stages of conflicts are outlined. Current status of claim in construction industry and reasons for high number of claims in the industry is discussed. The main causes of claims in construction projects are reviewed. The saturation of research into causes of claim and repetition of already identified causes of claims in new researches are noted. The repetition of same types of claims in the projects is attributed the low rate of learning in project based organisation. Using the pathogen concept it is explained there are many potential sources of dispute and claim in construction project (especially in major projects) and contracts try to clad over them. However as we see in the next chapter contracts are intrinsically in complete and if their defects coincide with pathogens in the project dispute will materialise.

The next chapter deals with the role of contract in prevention of claim.
CHAPTER THREE - CONTRACT AND CLAIM

3.1. Introduction

Anticipating the possibility of opportunistic behaviour and conflict, firms usually rely on inter-firm governance mechanism to mitigate relationship risks and facilitate cooperation (Lumineau and Malhorta, 2011). Contractual arrangements are one the mechanisms which establish such governance (Williamson, 1985). Contracts help parties to constrain attempts to exploitation by defining rights and responsibilities (Brown et al., 2000).

Contracts affect people’s behaviours not only directly by defining appropriate behaviour, but also indirectly by shaping expectations and beliefs (Lumineau and Malhorta, 2011). Similarly, March (1994) maintains that contract provides the lens through which firms evaluate each other’s behaviour, and the appropriateness of their own responses. Therefore contract can have an influential role in formation of dispute in projects.

Contracts shape the project culture because: (1) Project is a temporary relationship in which prospect of the future transaction discipline people’s behaviour; and (2) As personnel turnover is common during the project the contract is the key framework for setting the standard of behaviour and project performance. (Loch et al., 2006)

Following describing the dispute situation in construction projects in the previous chapter, this chapter focuses on contracts as legal frameworks of projects. It starts with the definition of a contract followed by uncertainty in construction contracts. It then goes to methods of payment as a common method for handling these uncertainties. Consequently, some theoretical foundations of a contract are discussed using principal agent theory, transaction cost economics and relational contracting. Over the years, standard forms of contracts have been developed to
prevent confrontations in the construction industry; these contracts are briefly introduced in the next section. Finally, partnering as the latest development in the prevention of claims in projects is discussed; it has been widely introduced as a procurement strategy that can manage all these uncertainties, therefore this type of contract is reviewed in more detail.

3.2. What is a Contract?
A contract is an agreement made between two or more persons which is binding in law, and is capable of being enforced by those persons in the court or other tribunal (such as arbitral tribunal). People who sign contracts are known as the “party” or “privy” to the contract and they are entitled to “enjoy privity of contract” (among others Speaight, 2010 and Jaeger and Hök, 2010).

The contract usually contains a promise or a set of promises that each party has made to the other. This type of contract is known as a bilateral contract because each party promises to do something. For example X promises to build a building for Y and in return Y promises to pay X for doing so.

Contract law is used in at least two ways:

1. **To remedy in the event that something goes wrong:** These remedies can be ordered by a court, for instance if any damage is done, or can be excusable without referral to a court i.e. the termination of a contract in the case of a breach.

2. **To regulate the relationship between the parties and plan what is to happen in future:** It usually contains the primary obligations such as purpose of contract, price, delivery time and the mechanism by which the primary obligation will be adjusted.

Summers (1971) names these two functions relatively as “the grievance remedial technique” and “the private arranging technique” and notes that the breach of contract is a situation in which these two functions overlap.

According to common law, contract has three requirements:
1. The intention of the parties to create a legal relationship

2. Presence of agreement between the parties

3. Considerations for the agreement

Turner (2004) maintains that it is through the contract that the owner creates the projects’ organisation and ‘employs’ legal persons (contractors) to work on their projects, therefore the owners should try to motivate contractors through the contract to achieve their goals (a win–win game). He concludes that when developing the contract strategy the client should choose a proper contractual arrangement that can encourage cooperation between themselves and their contractors and the suppliers and provide an incentive to the contractors to achieve their objectives. To do so, it is important that a contract addresses the risks and provides a safeguard to protect contractors against them; it should encourage all the parties to act rationally together to achieve common objectives, and the best outcome for all considering the expected risks.

Hughes (2006) believes that the law of contract relies on some basic assumptions:

- Meeting of minds or mutual understanding between the parties (also known as consensus ad idem).
- The contract term expresses the intention of the parties.
- The parties are free to enter the contract on any terms they wish.
- The effect of the contract is restricted to the parties.

### 3.3. Classical Contracts, Neoclassical Contracts and Relational Contracts

Contractual relations occur in various patterns along a spectrum ranging from highly discrete to highly relational (MacNeil, 1987). According to Campbell (2001) in placing contractual relationships along this spectrum, primary determinants are: duration of
relationship; thickness of future relationships between the contracting parties; the clarity of future rights and obligations.

Classical and neoclassical contracts are both considered as “spot contracts”, a contract for an immediate exchange where the most important variables are price, quantity and quality. In these contracts no relation besides the simple exchange exists between the parties (MacNeil, 1980). According to these schools of thought contract law should be a “rough and ready” device to help practical people achieve their goals with elementary justice (Movsesian, 2005).

Neoclassical contract law is associated with legal realities and the distinguishing attributes include the duty of good faith, trade usage and the increased use of reliance as a base for liability (Hilman, 1988). These contracts suggest a more socialised conception of contract than classical contract law (Kessler and Gilmore, 1977).

Relational contract theory was developed as a reaction to the unrealistic portrayal of contracts in classical and neoclassical contract law and neoclassical economics. It emphasises the importance of social context in the governance of contractual relationships. According to MacNeil, “contracts” are relations among people who have exchanged, are exchanging, or expected to be exchanging in the future. He further expresses that all exchanges occur in relations (Campbell, 2001). Relational contracts are discussed in more detail in section 3.8.

3.2. Relationship between Contract and Claim

Today construction contract is a specialist branch of contract law. This can be understood from the number of law firms who set up construction departments and developed expertise in this field (Hughes, 2006).

Bunni (2005) expresses that construction contracts are unique in that they seek to provide for a specific remedy should any event of breach of terms and conditions happen within its framework, and for contractual entitlements associated with certain events. Therefore it is essential for the parties in a contract to fully
comprehend the terms of the contract and remedies which are foreseen in it. Many scholars (among others Morgan, 2008; Totterdill, 1997; Murdock, 2005) believe that most construction claims have been caused by misinterpretation of one or more clauses in the contract.

According to Cooper et al. (2005) any contract regardless of its size or purpose is intended to transfer risks and allocate them to an individual or an organisation to be managed for the duration of the arrangement. The problem with contractual risks is that even if the contract is silent about a risk, the risk still lies on one of the parties and that will cause a dispute. Kumaraswamy (1997) believes that most disputes arise from unclear or inappropriate allocation of the risks, and risk allocation is the core of contractual and governance structure.

Spiess and Felding (2009) argue that most of the claims in engineering, procurement and construction projects are related to the interpretation and the use of contracts. They specifically mention three types of contract provision that can cause conflict to arise if subjected to different interpretation:

1. Provisions deal with obligations of parties.
2. Provisions deal with approvals and acceptance.
3. Provisions about conflict resolution (it is mostly relevant after materialisation of conflict).

As Hartman (1996) says, even in the most carefully drafted contracts, some clauses may be open to interpretation.

Bunni (2005) asserts that all claims under construction law can be categorised in one of these four legal and one non-legal groups:

1. A claim under the contract.
2. A claim arising out of or in connection with the contract.
3. A claim under the principle of the applicable law.
5. A claim for ex gratia payment.

Considering the role of contract in the formation of claims, selection of a right contract can be influential in reducing claims. Some methods of risk sharing in selecting the form of contract and payment are discussed in section 3.4.

3.4. Principal Agent Theory

Many Scholars believe that the selection of a contractor (or supplier) is a form of “principal-agent” problem (among others Turner, 2004; Winch, 2010 and Eriksson, 2008). Jensen (2000) defines an agency relationship as a contract under which the principle (or client) engages another party, the agent (or contractor), to perform a service on his behalf which involves delegation of some decision making authority to the agent. The problem that rises here is that in a situation which both ‘principle’ and ‘agent’ are seeking to maximise their own utility there is a good reason to believe that the agent will not act in the best interest of the principle. Such a situation is a major source of dispute.

Eisenhardt (1989) argues that in any project, selection of an agent is inherently associated with three problems:

1. Adverse selection
2. Moral hazard
3. Risk allocation

According to Turner (2005) this delegation of authority is problematic because:

- Usually, the interest of principle and agent diverge.
- The principle is not able to control the agent’s activities completely and costlessly.
- The principle is not able to perfectly obtain and monitor the information available to the agent.
Moe (1995) summarised the problem in relation to the principle and agent under two headings:

1. **Adverse selection problem:**

   How can a client be sure that the suppliers once selected will fully mobilise their capacities on the client’s behalf, rather than on behalf of themselves or other organisations? In other words, the client might find himself trapped in an unfavourable transaction after signing a contract, or he might not enter a relationship at all because of the anticipation of being taken advantage of.

2. **The moral hazard problem:**

   How can the client be sure that the most enthusiastic bid is not the most desperate one? Considering that the agent (supplier or contractor) always has more information about his capabilities than the client (i.e. information asymmetry), how can a client encourage a contractor to consummate the contract instead of perfunctory performance of the contract?

Winch (2010) lists some of the reasons of the post contract moral hazard problem:

- Suppliers have information that is critical for the client’s decision making but has no incentive to share it.
- Buyers cannot easily monitor the quality of the services received, therefore suppliers might be tempted to provide lower quality goods or be less than diligent in the supply of the service.
- Clients can hardly measure the relative performance of different contractors in the project.
- Uncertainties regarding the utility of the facility mean that the client may wish to modify the functionality as new information is obtained during the project.

Bergen (1992) suggests a solution to this problem by designing a contract strategy so that the action regarded most appropriate by the principal provides the highest pay
off for the agent. Winch (2010) believes that selecting a suitable contract can fulfil this requirement. However, Turner (2005) contradicts the idea and maintains that contract selection is influenced by more factors than just the agent’s pay off. He expresses that contracts are selected to minimise the overall cost of governing projects, and therefore they are selected from a transaction cost economic perspective.

Winch (2010) argues that continually adjusting a contract with up to date information can solve the moral hazard problem and points out that some new generations of standard contracts in particular NEC3 have some mechanisms to do this adjustment:

- Specifying the conditions under which the adjustment can be made: The ECC calls them “compensation events” and discusses them in detail; they vary from a client changing his mind to severe weather conditions.
- Specifying an authority system to facilitate change: The ECC assigns the project manager to administer the contract on behalf of the client and communicate with contractors if any compensation event happens.
- Providing incentives to motivate the contractor: The ECC provides both penalties for damage and delay and positive incentives for good performance.
- Using an administered price system to handle uncertainties: The ECC provides for the option of payments based on the bill of quantity (BOQ) and adjustment of the rates in case of inflation.
- Providing conflict resolution procedures: The ECC provides for the appointment of an adjudicator jointly by contractor and client.
- Specifying standardised operating procedures: The ECC has a whole book on flow charts showing how each decision to adjust the contract must be handled.
• Posting credible commitments providing arrangements for the measurement of contractor performance: The ECC foresee the option of performance bonds.

According to Aulkah (1996) the principal (client) can influence the agent (supplier) with three different types of control:

1. **Output Control**

This is when the principal monitors the outcomes produced by his partner (Aulkah, 1996). It is usually used when the principal can evaluate and measure the output, but has limited knowledge about the transformation process (Das and Teng, 2001). Output is closely related to price mechanism and market structure (Hennart, 1993).

2. **Process Control**

This type of control is concerned with the partner’s behaviour or means used to achieve the desired goal (Auklakh, 1996). Increasing interdependencies by increasing specific investment in the transaction makes output control less efficient and process control more appropriate (Aulkah and Gencturk, 1995). This can be due to difficulty in measuring outputs because of bounded rationality, high asset specificity or high level of uncertainty (Williamson, 1996 and Das and Teng, 2001). Process Control is feasible when the principal is aware of the required processes for achieving the ultimate goal (Collins, 1993 and Das and Teng, 2001). When goal measurement and process monitoring is not possible for the principal, social control is the control method of choice (Collins, 1993 and Das Teng, 2001).

3. **Social Control**

This form of control functions by reducing the divergence of preferences among the parties (Eisenhardt, 1985) by forming a common organisational culture which encourages self control (Auklakh, 1996).
3.5. Contract and Uncertainty

In theory the contract tries to reduce uncertainty in relation to each party’s responsibilities. However, as Ward and Chapman (2008) report, in practice substantial uncertainties remain in association with items such as:

1. Inadequate or ambiguous definition of terms (e.g. specifications, responsibilities of the parties to cooperate, advise, coordinate, supervise, etc.)

2. Inappropriate definition of terms (e.g. performance specifications, variations, extensions).

3. Interpretation of risk appointment implied by standard contract clauses may differ between the contracting parties.

4. Variations (e.g. power to order, express and implied terms, pricing and payment mechanisms).

5. Payment and claim arrangements (e.g. timing and conditions of payment).

6. Defects liabilities (e.g. who has to be satisfied, who could be responsible, extent of liabilities).

Different definitions have been provided for “uncertainty”. They vary from a state of environment to a state of a person who perceives himself lacking critical data about the environment. Table 3.1 shows some of these definitions.
Table 3.1 Definitions for uncertainty in the literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milliken</td>
<td>1987</td>
<td>An individual's perceived inability to predict something accurately either because lacking sufficient information or unable to discriminate between the data.</td>
</tr>
<tr>
<td>Brasher</td>
<td>2001</td>
<td>When detail of a situation is ambiguous, complex, unpredictable, or probabilistic; when the information is unavailable or inconsistent; and when people feel insecure in their own state of knowledge or the state of knowledge in general.</td>
</tr>
<tr>
<td>Barbow</td>
<td>1992</td>
<td>It is experienced when a person assesses the probability of an event.</td>
</tr>
<tr>
<td>Atkinson et al.</td>
<td>2008</td>
<td>Uncertainty results from vagueness, ambiguity and contradiction associated with lack of clarity because of lack of data, incomplete and inaccurate detail, lack of structure to consider an issue, the working and framing assumptions being used to consider the issue, known and unknown sources of bias, limited control of relevant project players and ignorance about how much effort it is worth expending to clarify the situation.</td>
</tr>
<tr>
<td>Howell et al.</td>
<td>2010</td>
<td>Lack of information.</td>
</tr>
<tr>
<td>Chapman</td>
<td>2006</td>
<td>It is lack of certainty in a simple language sense... [whereas] risk is the possibility of departure from expectations which matter.</td>
</tr>
<tr>
<td>Winch</td>
<td>2010</td>
<td>Absence of information required for the decision required to be taken at a point in time.</td>
</tr>
</tbody>
</table>
Gidado (1996) lists four causes for uncertainty of an individual task:

1. Management is not familiar with local resources and local environment.

2. Lack of complete specification of activities during the construction.

3. Lack of uniformity of materials, work and team with regard to place and time (every project is unique).

4. Unpredictability of environment.

He also mentions three factors related to interdependency of operations in a project:

1. The number of technologies and interdependency among them.

2. The rigidity of sequences between the various main operations.

3. Overlap of stages or elements of construction.

Eccles (1981) mentions two other factors which can raise uncertainty:

1. Involvement of different trades in the project.

2. The fact that parts of the main contract is handed to subcontractors under separate contracts.

Ward and Chapman (2003) note that there are essentially some uncertainties in relation to major construction projects:

- Lack of clear scope of work.

- Novelty, or lack of experience in this particular activity.

- Complexity in terms of the number of influencing factors and interdependencies between them.

- Possible occurrence of a particular event or condition that could affect the activity.
• Uncertainty about the estimation and the assumption made during the estimation process.

• Uncertainty about logistics.

• Uncertainty regarding objectives (including hidden ones) of stakeholders.

• Uncertainties associated with the multiplicity of people and organisations involved in the project, such as coordination, communication, capability, personal conflicts, etc.

Atkinson et al. (2006) note that in major projects uncertainties are more associated with the people involved in the project and less related to the technology. Multiple parties involved in the project and project management organisation often play influential roles. They identify some of these uncertainties as:

• Uncertainty about the level of performance that will be achieved by each party.

• The objectives and motivations of each party.

• The quality and reliability of work undertaken by each party.

• The extent to which each party’s goals are aligned with the project owner’s objectives, and the scope for moral hazards where one party is motivated to do things which are not in the best interests of the project owner.

• The actual ability of the parties.

• Availability of the parties.

Table 3.2 summarises some of the literature on uncertainty and risk factors in the construction projects:
Table 3.2 Sources of uncertainty in construction projects as mentioned in the literature

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Author</th>
<th>Date</th>
<th>Risk (or uncertainty)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chapman and Ward</td>
<td>1994</td>
<td>(1) Specification of work is incomplete or ambiguous; (2) the work is of a novel nature; (3) changes are made during the project; (4) the working environment is uncertain in some respects</td>
</tr>
</tbody>
</table>
| 2    | Chapman              | 2001     | **Controllable:** (1) late planning submission; (2) lack of change control procedure; (3) lack of design coordination; (4) late commissioning of sub-contractor drawings; (5) late completion of design drawings; (4) errors  
**Uncontrollable:** (1) Changes imposed by planning; (2) inflation; (3) taxation; (4) late completion of infrastructure by others; (5) change in legislation |
| 3    | Smith et al          | 2006     | (1) **Physical:** natural, ground condition, adverse weather, physical obstruction; (2) **Construction:** availability of plant and resource, industrial relations, quality, workmanship, damage, delay, construction programme, construction technique, milestones failure to complete, construction contract, construction cost, commissioning, insurance, bonds, access to site and insolvency; (3) **Design:** incomplete design, availability of information, meeting specifications and standards, variations in design during the construction; (4) **Technology:** dealing with new technology, provisions for change in the existing technology, development cost |
| 4    | Flanagan and Norman  | 1999     | Design, construction cost, latent defects, faulty materials safety, completion deadline and quality                                                                                                                                                                                                                                                   |
| 5    | Zavadskas et al.     | 2010     | (1) **Project risks:** time, cost, quality, technological, construction; (2) **External risks:** political, economic, social, weather; (3) **Internal risks:** site, stakeholders, resources, errors in documents and information                                                                                                                                                                         |
| 6    | Sayegh               | 2008     | (1) **Internal:** owner, designer, contractor, subcontractor, supplier; (2) **External:** political, social and cultural, economic, natural, legal and contractual                                                                                                                                                                                                   |
| 7    | Miller and Lessard   | 2001     | (1) **Market related risks:** risks associated with market for the product and ability of generating revenue, construction risks, operation risks; (2) **Completion risks:** risks inherent in design and technology used ; (3) **Institutional risks:** ability of project to pay its debts, social acceptability, sovereign risks |
| 8    | Mead                 | 2007     | Resource or reserve risk, political and security risk, raw material or supply risk, operational risk, market risk, financial risk, force majeure risk, contractual risk, design, construction, operating, financial and funding, compliance with rules and regulations , health and safety, environment, cultural heritage, taxation, currency, change in government, site condition and access, interfaces, weather condition, insurance, disputation, escalation, insolvency |
| 9    | Hassanein            | 2007     | Taxation, commencement and completion of work, payments, warrants, change to work                                                                                                                                                                                                                                                                  |
Williamson (1996) believes that rationality is bound to be limited in all transactions; Turner (2004) maintains that in the project environment this limitation is rooted in the inability to precisely:

- Foretell the future;
- Process information to interpret events;
- Communicate with each other.

Winch (2001) defines project process as a process of progressive reduction of uncertainties through time, and expresses that reducing uncertainty is one of the fundamental business processes in any industrial sector including construction. Figure 3.1 shows how the project starts with lots of uncertainty and different alternatives with each part and ends when all features of the product are known. In a similar approach Porter (1985) also considers a project as a process of uncertainty reducing and value generating.

![Figure 3.1 Reduction of uncertainty through time (Source: Winch, 2001)](image)

According to O’Reilley (1994) uncertainty in the context of contract reduces the effectiveness of project management as resources need to be channelled into
discussions about the division of responsibility within the project, and ultimately, uncertainty can lead to conflict.

Winch (2001) maintains that governance structure in project organisation is two dimensional: Vertical governance and horizontal governance. The vertical governance manages relationships between the client and all parties which are directly in a contract with him. The number of vertical transactions can vary from one (in turnkey contracts) to more than fifty (in construction management contracts). Behind each vertical transaction can be a set of horizontal transactions through which first tier contractors mobilise required services. Material suppliers and subcontractors form these horizontal chains. All these transactions are subjected to uncertainties and insert uncertainty in the project system. Rahman and Kumaraswamy (2005) call this matrix of uncertainties “inherent complexity and uncertainty in construction projects”.

Smith et al. (2006) suggest that uncertainties and risks must be controlled both vertically and horizontally through the projects. Figure 3.1 shows exposure to uncertainty during the project life cycle. Uncertainties in all phases of a project are potentially sources of conflict, but as shown in Figure 3.2, as a project progresses, the amount of uncertainties decrease.

![Figure 3.2 Risk exposures in a project's life cycle (Source Smith et al, 2006)](image)

When a client decides that he has not enough capability for performing the project in-house (using a hierarchical structure) or when the cost associated to a hierarchical
structure outweighs the gains from reducing information asymmetry, the client has to enter the contract as a third party. The three basic types of contracts available are: Fee-based contracts, fixed price and incentive contracts (Low, 2007 and Winch, 2010).

3.6. Procurement Strategy and Uncertainty

Moshini and Davidson (1989) define Procurement in construction as the acquisition of new buildings, or space within buildings, either by directly buying, renting or leasing from the open market, or by designing and building the facility to meet a specific need. Similarly, Rowlinson (1999) defines procurement as acquisition of project resources for the realisation of a constructed facility.

According to Palaneeswaran et al. (2003) procurement refers to the process of acquiring or obtaining material, property or services, and begins with the determination of a need for a property or service, ands with the completion and close-out of a contract.

The Cunseil International du Batiment (CIB) Working Commission (W092) defines procurement as “the frame work within which construction is brought about, acquired or obtained”.

Contract strategy is not the same as procurement system, however it forms an essential part of procurement system. The rationale behind the definition is that the procurement system involves other factors such as culture, management, economics, environment and political issues (Rowlinson, 1999).

Lenard and Moshini (1989) as well as Walker and Rowlinson (2004) believe that the client is in the centre of procurement system and maintain that procurement strategy should satisfy the client’s development and operational needs with respect to provision of constructed facilities or discrete life cycle.

The nature of client is of great importance in formation of procurement strategy (Love et al., and Rowlinson, 1999). Newman et al. (1988) identify 18 different types
of clients including private, commercial, industrial, developers, education and public authorities. According to Rowlinson (1999) expectations vary from client to client but include ideas such as:

- Minimum disruption in client’s ongoing businesses
- Appropriate level of client involvement in procurement process
- The right for assessing cost, time, quality, function and performance of the project.

Love maintains that experienced public sector clients are distinguished with their needs for accountability and clarity and therefore have tendency toward forma of contract such as traditional lump sum in which direct comparison facilitates accountability.

Procurement systems are widely classified as:

- Conventional (separated)
- Management Contract (integrated)
- Turnkey, Package Deal or EPC (packaged)
- Framework Agreement
- Partnering
- Alliance

This research doesn’t deal with procurement systems, however each type is briefly introduced in the following sections.

Turner (1995), Smith (2003) and Marsh (2003) identify two main dimensions of contract: (1) the role and scope of supply; and (2) the payment term. Client’s strategy in dealing with project risk and uncertainties is often reflected in these two dimensions.

**3.6.1. Role and Scope of Supply**
3.6.1.1. Conventional Approach
This approach is commonly used in engineering projects. The roles of the designer and the construction contractor are completely separate and the construction contract is usually supervised by the design contractor on behalf of the client.

Contracts (usually admeasurements or lump sum) are awarded based on competitive tenders, and usually the lowest price. There are usually pre-qualifications before invitation to tender and tendering performed after completion of the design.

Coordination between the design and construction is the responsibility of the designing company.

Tender prices are supposed to include contingency for associated risks, which means client pay an additional amount to the contractor for transferring risks to him.

3.6.1.2. Management Contracting Approach
This type of contract is used when a client wants a third party to coordinate and supervise the design and construction. In these projects the management contractor usually places a contract for the package of work and oversees the work himself to ensure that the client receives what he required. The client transfers all risks except those which are related to the operation of the projects to the management contractor. The management contractor can transfer the risks he holds to the work contractors through contracts between them. The management contractor is usually reimbursed for all his expenses, and receives a fee (either fixed or a percentage of the total cost) to cover overheads. It is claimed that this approach can reduce delays and claims as smaller packages of work are awarded to the contractors, and it can enhance flexibility. This approach is usually used when there is a need for an early start, flexibility associated to scope change or construction method and also where the client has insufficient resources.
### 3.6.1.3. Turnkey - Package Deal - EPC

In this approach the client gives detailed information about what he requires and awards a single contract for the whole package. It is the responsibility of the contractor to design the facility, construct it, procure the machinery and commission it. Some variations of this approach also include maintenance and operation to ensure that the facility works as required by the client. These contracts are used by clients who know exactly what they need but do not possess the resources to perform the job themselves. They are also used when the design and construction method are interrelated, where patented processes are involved and when early completion is required.

The standards required, construction and performance specifications and outline drawings are usually part of the contract (sometimes known as a basic package which is prepared after the feasibility study). The contract should clearly split the scope of responsibilities and liabilities, especially regarding approval and acceptance of design before starting construction or placing a purchase order.

Unlike design and build projects, in turnkey projects the contractor is ultimately responsible for any defect in design, and the client’s approval only implies that it meets the specification.

Package deal contracts transfer almost all of the project risks to the contractor, but once the specification has been handed over it is very difficult for the client to implement any change. The client needs to issue a formal change order for any change which entitles the contractor to extra time and money.

These contracts are usually fixed price and with no provision for price adjustment and therefore they are very attractive to clients especially when they have a limited budget to finish the work. Due to the rigidity of contractual conditions, the contract and information provided during the tender must be prepared with utmost care.

These contracts have been used successfully in the oil and gas industries since early 1980s. They have been profitable for the contractors willing to take risk and have provided operators with an efficient way of running complex projects.
The EPC contractor provides the client with a single-point of responsibility, communication and coordination related to the major activities involved. That reduces the complexities of contract administration and interface in large-scale projects (Schramm et al., 2010).

Up until recently most of the oil and gas projects were performed using Engineering, Procurement, Construction (EPC) contracts, Engineering, Procurement, Installation, Commissioning (EPIC) contracts and similar arrangements. For instance in 2000 the value of EPC contracts performed by some of the major oil and gas contractors is shown in figure 3.3.

![EPIC Contracts (Year 2000) Revenues in $ billion](image)

**Figure 3.3** Pro-forma revenue from EPIC projects. *(Source: Harris et al., 2004)*

In the recent years demand destruction and premature shelving of many projects, major swing currency rates have resulted in reduction of profit margins and cut throat competition. At the same time Unpredictable market condition and price fluctuations, inadequate definition of the work and its requirements and increasing involvement of NOCs and their pressure for using local subcontractors with questionable capabilities have lead to a situation in which the risks outweigh the rewards. Therefore some of the icons of oil and gas industry such as Halliburton, McDermott and Stolt have publicly stated that they will avoid EPC contracts (Harris et al., 2004 and Ranjan, 2009).
3.6.1.4. **Framework Agreement**
It is a long-term agreement between the client and contractor which allows the client to award work based on predefined conditions.

3.6.1.5. **Partnering**
Reading Construction Forum (1995) defines partnering as ‘a management approach used by two or more organisations to achieve specific business objectives by maximising the effectiveness of each participants’ resources. The approach is based on mutual objectives, an agreed method of problem resolution, and an active search for continuous measurable improvement.’

The promoters of partnering see the main problem of the construction industry in the parties’ effort to persuade their own objective without any consideration for the others’. This mindset leads to conflict litigation and sometimes even failure of the project. With this mentality, success comes at the expense of the others.

Partnering has been widely encouraged in the UK to repair the adversarial contractual environment by improving collaboration and trust. Partnering is the process of forming and maintaining good relationships among all stakeholders and assuring that they are committed to each other and to the project. Partnering can reduce transaction costs by unifying all the parties into one team.

3.6.1.6. **Alliances**
Alliances are another method for collaborative work which has initially been used in construction of the North Sea off shore platforms. These projects were traditionally awarded based on fixed price contracts to the designer, construction contractor, electrical and mechanical installation contractor, etc. under separate contracts. The traditional approach required the scope of works to be defined and fixed before the contracting, and any change in design could cause a huge increase in the cost of the project.

Alliances are formed based on these principles:

- Aligned goals and objectives.
- Commitment to aggressive cost reduction.
- Trying to remove procedural inefficiencies, duplications and traditional contract interfaces.
- Formation of integrated teams.
- Early involvement of contractors in the project to optimise design and reduce cost.
- Aligned and equitable contracts.
- Shared profits and risks through overall alliance performance and individual contractor’s progress.
- Maintenance of the highest standards of quality and safety.

![Figure 3.4 Speculative risk in different procurement methods](Source: Clamp et al., 2007)

### 3.6.2. Payment Terms
3.6.2.1.  **Fee-based Contracts**
Fee-based contracts are those in which services are provided based on an agreed rate as a function of an agreed parameter. This type of contract is usually used when it is possible to roughly identify the type of resources required but it is not feasible to identify the quantities. As a general practice, fee-based contracts are used in relatively high uncertainty circumstances such as early stages of design (Bajari and Tadelis, 2001).

In construction there are two well established practices for using fee-based contracts:

1. Cost reimbursable contracts
2. Percentage fee

3.6.2.2.  **Fixed-price Contracts**
Fixed-priced contracts are those in which the price for the service has been fixed and agreed upon before the commencement of the work. They can be either lump sum in which the price of a total contract is fixed or be subject to measurement after completion of the work (also known as unit rate contracts).

Fixed-priced contracts are used when the level of uncertainty is very low at the time of contracting; however provisions for minor adjustment in case of inflation and variations by the client are seen in the contract. These contracts are widely used in public construction works.

3.6.2.3.  **Incentive Contracts**
Incentive contracts mix both features of lump sum and fee-based contracts. They have different varieties but the common feature of them is a positive incentive within the contract to motivate the contractor through gain sharing between the parties.
These contracts consist of a target price, which is formed by an estimated actual cost ($AC_e$), plus an agreed percentage fee ($F$) to cover the contractor’s overheads and profit.

When the outrun ($AC_o$) is greater than the estimated actual cost ($AC_e$) the contractor pays a share of the excess cost, and when the outrun ($AC_o$) is less than the estimated actual cost ($AC_e$) the contractor is paid a share of the saving. The sharing should not necessarily be linear and can be capped to limit the risk of one of the parties relative to the other. Figure 3.5 shows guaranteed maximum price (GMP) and guaranteed maximum liability (GML) which relatively caps the risk of the client and risk of the contractor.

![Diagram of Incentive Contracts](image)

**Figure 3.5** Incentive Contracts (a) with guaranteed maximum price; (b) with guaranteed maximum liability (GML) (source: Knott, 1996)

### 3.7. Selecting an Appropriate type of contract

According to Love et al. (1998) there is a consensus that for each project, there is a procurement method which is in some sense ‘better’ than all others. Gordon (1994)
suggests that selection of the suitable procurement method can reduce construction cost by five percent. Luu et al. (2003) consider the selection of appropriate procurement method as a project success factor and Masterman (1996) considers failure to do so as a main cause of project dissatisfaction.

Love et al. (2008) maintain that traditionally most clients require projects to be completed on time, within the budget, to the highest quality and in recent years being environmental friendly has been added to the requirements.

The National Economic Development Office (NEDO, 1985) proposes 9 criteria which clients can use to identify their priorities in the project:

1. Time: Is early completion required?
2. Certainty of time: Is on time completion of the project important?
3. Certainty of Cost: Is a firm price needed before the commitment to the project is given?
4. Price Competition: Is the selection of the construction team by price competition important?
5. Flexibility: Are variations a necessity after commencement of the work?
6. Complexity: Does the project need to be highly specified?
7. Quality: Is high quality of product (in design and workmanship) important?
8. Responsibility: Is the client singly responsible for the work or does project management or construction management take care of the matter?
9. Risk: Is the transfer of deviation from time and cost from client to contractor important?

Luu et al. (2003) believe that using oversimplified models (like that of NEDO) will lead to the selection of a sub-optimal procurement method. They argue that three sets of parameters should be considered for selection: Client’s characteristics, projects characteristics, and environmental factors.
Kumaraswamy and Disaanyaka (1998), Luu et al. (2003) and NSW Department of Public Works (2006) identified the criteria that a client should adhere to when selecting a procurement method. Table 3.3 shows these criteria.

To ensure that project risks are dealt with in the most proper way, the client must identify the risks and adopt the contract strategy which best suits the uncertainties and risks associated with the project.

Figure 3.6 illustrates the correlation between basic project management concepts of flexibility, risk and incentive in different types of contracts as previously described.

![Diagram showing correlation between basic project management concepts of flexibility, risk and incentive in different types of contracts.](image)

**Figure 3.6 Factor influencing payment choices (Source: Smith et al, 2006)**
Table 3.3 Client priorities for procurement selection (Source: Love et al., 2008)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of design competition</td>
<td>Client experience</td>
<td>Design development flexibility</td>
</tr>
<tr>
<td>Level of price competition</td>
<td>Client type</td>
<td>Extent of design input by the agency</td>
</tr>
<tr>
<td>Economy</td>
<td>Client’s in house technical capacity</td>
<td>Flexibility of scope</td>
</tr>
<tr>
<td>Value for money</td>
<td>Client’s financial capacity</td>
<td>Ability to address complexity</td>
</tr>
<tr>
<td>Life cycle cost</td>
<td>Client’s willingness to take risk</td>
<td>Ability to address uncertainty</td>
</tr>
<tr>
<td>Speed</td>
<td>Client’s willingness to be involved</td>
<td>Ability to address the extraordinary</td>
</tr>
<tr>
<td>Time certainty</td>
<td>Client’s trust toward the other parties</td>
<td>Cost/time with brief quality</td>
</tr>
<tr>
<td>Urgency to complete project</td>
<td>Client’s requirement for technically advanced product</td>
<td>Flexibility with the design brief</td>
</tr>
<tr>
<td>Urgency to commence construction</td>
<td>Client’s requirement for aesthetic product</td>
<td>Flexibility with scope, agency, design and technology change</td>
</tr>
<tr>
<td>Importance of intermediate milestone</td>
<td>Client’s requirement for within budget completion</td>
<td>Impact of design change</td>
</tr>
<tr>
<td>Aesthetic value</td>
<td>Client’s requirement for low operational cost</td>
<td>Brief/ design realisation cost/time</td>
</tr>
<tr>
<td>Durability</td>
<td>Client’s requirement for low maintenance cost</td>
<td>Package coord/interface risk</td>
</tr>
<tr>
<td>Innovation</td>
<td>Client’s requirement for value for money</td>
<td>Design continuity</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>Project size</td>
<td>Contractor design responsibility</td>
</tr>
<tr>
<td>Construction risk allocation</td>
<td>Project type</td>
<td>Optimising life cycle cost</td>
</tr>
<tr>
<td>Design risk allocation</td>
<td>Construction method</td>
<td>Optimising maintenance and defect minimising</td>
</tr>
<tr>
<td>Financial risk allocation</td>
<td>Site location</td>
<td>Contractor’s maintenance responsibility</td>
</tr>
<tr>
<td>Allocation of other risks</td>
<td>Unknown site risk factors</td>
<td>Completion timing certainty</td>
</tr>
<tr>
<td>Need for mid project design change</td>
<td>Known factors likely to cause a problem</td>
<td>Completion timing minimised</td>
</tr>
<tr>
<td>Need to be kept informed</td>
<td>Usage of pioneering technology</td>
<td>Min. time per contract</td>
</tr>
<tr>
<td>Need to be involved</td>
<td>Market’s competitiveness</td>
<td>Flexibility with timing changes</td>
</tr>
<tr>
<td>Need to assign single point responsibility</td>
<td>Technology feasibility</td>
<td>Flexibility with cash flow control</td>
</tr>
<tr>
<td>Need to delegate decision making</td>
<td>Regulatory feasibility</td>
<td>Early start to design</td>
</tr>
<tr>
<td>Desire for good communication</td>
<td>Materials availability</td>
<td>Staged design allowance</td>
</tr>
<tr>
<td>HSE concerns</td>
<td>Experienced contractor availability</td>
<td>Early start to construction</td>
</tr>
<tr>
<td>Importance of planning</td>
<td>Labour productivity</td>
<td>Staging flexibility</td>
</tr>
<tr>
<td>Importance of control</td>
<td>Inclement weather</td>
<td>Delay effect of one contract on others</td>
</tr>
<tr>
<td>Technology transfer/exchange</td>
<td>Natural disaster</td>
<td>Capital cost minimised</td>
</tr>
<tr>
<td>Technology innovations</td>
<td>Industrial actions</td>
<td>End cost versus budget certainty</td>
</tr>
<tr>
<td>Operational guarantees</td>
<td>Objection from lobby groups</td>
<td>Value for money for special projects</td>
</tr>
<tr>
<td>Design life certainty</td>
<td>Objection from neighbours</td>
<td>Risk of contractual claims</td>
</tr>
<tr>
<td>Maintainability</td>
<td>Political constraints</td>
<td>Extent of management/effort for agency for general project</td>
</tr>
<tr>
<td>Constructability</td>
<td>Cultural differences</td>
<td>Risk contingency in tender prices</td>
</tr>
<tr>
<td>Reduce environmental impacts</td>
<td>Minimising tender costs</td>
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</tr>
<tr>
<td>Dispute minimisation</td>
<td>Quality certainty</td>
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<td></td>
<td>Quality of management</td>
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<td></td>
<td>Choice of subcontractors</td>
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<td></td>
<td>Availability of subcontractors</td>
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<td></td>
<td>Simplicity of contract</td>
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<td></td>
<td>Reliance on relationship</td>
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<tr>
<td></td>
<td>Novation/relationship complexity</td>
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</tbody>
</table>
As shown in Figure 3.6, different procurement options offer different risk profiles. A cost reimbursable contract literally signs an open cheque to the contractor, therefore detailed auditing and invoicing procedures shall be put in place to minimise opportunistic behaviours. This type of contract is generally used for the relatively low value projects and in conditions of high uncertainty (Winch, 2010).

Percentage fee contracts protect clients much more against opportunism as the parameter used for calculation of a fee cannot be directly changed. Fixed price contracts transfer almost all risks to the contractor; however the supplier is usually protected against changes which are beyond his control. Finally, incentive contracts share risks and responsibilities more evenly, there are also GML and GMP options to change the contract in favour of the contractor or client as shown in Figure 3.3.

According to Love et al. (2008) the selection of a procurement method is often *fait au complait* for the contractor. Their study showed that more than 95% of the studied projects have been delivered on a fixed-price lump sum basis and alternative procurement methods have been used only when:

- Circumstances were ‘abnormal’, for instance to procure a project beyond their budget.
- A minister, treasury or the like suggest another procurement method other than the default fixed-price lump sum.

The reason for popularity of fixed-price contracts includes: policy, ability to deal effectively with project risks (time, cost and quality), familiarity and acceptance within the industry, satisfies public accountability, provides maximum client’s control over the project outcome and provides cost certainty. However, in practice very few public projects are completed within the tender price (among others Flybvjerg; 2002; Rowlinson, 1999). Rowlinson (1999) contributes this problem to incompleteness of drawings and bills of quantity (BOQs) at the time of tender, and claims that cost certainty in such conditions is a fallacy. He asks why clients still continue to use this method which leads to:

- Lack of flexibility
• A price to pay in terms of claim-conscious behaviour
• The fallacy of cost certainty
• A release of control by client organisation

In the fieldwork section, examples are provided in which despite contract rigidity the client is forced to accept the contractor’s demands for extra payments.

3.8. Transactional Cost Economics

3.8.1. Background and definition

The transaction cost idea was first presented by the Nobel Prize award economist Ronald Coase (1910) in his 1937 paper entitled ‘The Nature of the Firm’ in which he discusses “costs of using the price mechanism”. He noted that price mechanism or ‘invisible hands’ as mentioned by Adam Smith (1723-1790) are the essence of the market and bring supply and demand to equilibrium, however within a firm the price mechanism is suppressed and goods are traded by command. The question which he asked was ‘if price mechanism can really balance supply and demand why do firms exist at all?’ He answered this question using the notion of transaction cost and explained that any trade in the market involves transaction cost.

Furthermore, Oliver Williamson elaborates Coase’s theory and used it as a basis for modern corporation theory. According to him the transaction cost notion is an effort for better understanding of complex economic organisations by combining law, economics and organisational science (Williamson, 2005). It explains that the formation of hierarchical organisations instead of market relations can be due to the more efficient nature of these organisations in the production and distribution of goods and services (Williamson, 1979).

Different definitions have been provided for TCE; Williamson (1975) in Market and Hierarchy describes it as the cost for transferring goods or services across
technologically separable interfaces. Love (2002) defines it as the cost of carrying out an exchange; and Arrow (1974) describes transaction cost as the cost of measuring the valuable attributes of what is being exchanged and the cost of protecting rights and policing and protecting agreements.

In a perfect market in which information is perfectly and symmetrically available to everybody the cost of transaction is zero. North (1990) points out:

“The costliness of information is a key to cost of transaction cost which consists of cost of measuring the valuable attributes of what is being exchanged and the cost of protecting rights and policing and enforcing agreements.”

Clemons et al. (1993) state that transaction cost can be presented in terms of three major components:

Transaction cost = coordination cost + operations risk + opportunism risk

Coordination cost is the cost of coordinating with units producing the product and includes the cost of exchanging information and incorporating that information into decision processes, as well as the cost incurred by the firm due to communication inefficiencies. It also includes the cost of exchanging information on products (price, product characteristics and availability) and demand.

Operations risk is the risk that the other parties in the transaction willingly misrepresent or withhold information, or do not fulfil their commitments. Operations risk originates from differences in objectives among the parties and is catalysed by information asymmetries between the parties. For example, a supplier who has agreed to provide a component of a certain quality may actually provide one of an inferior quality knowing that it is difficult for the other party to measure the quality of the delivered product. Differences in bargaining power or incomplete or unenforceable contracts can also lead to operations risk. For instance, both parties may be fully aware of quality shirking, but the contract may not clearly cover that contingency, the damaged party may not be able to prove the violation to the
satisfaction of a court, or the costs of litigation may be prohibitive. Moreover, the damaged party may not have sufficient bargaining power to recover their losses in future transactions.

*Opportunism risk* includes the risks attributed to lack of bargaining power or the loss of bargaining power directly resulting from the execution of contract, that is, a difference between ex-ante and ex-post bargaining power. Two important sources of opportunism risk that have been examined extensively in the transactions cost literature are relationship-specificity of the investment and the number of potential suppliers for the product. Another source of opportunism risk widely recognised in the management literature is risk of loss of resource control.

Dahlman (1979) categorises transaction costs into three groups: (1) search for information costs; (2) bargaining and decision costs and (3) policing and reinforcing costs. He explains each of these elements as:

- **Search and information costs** are costs such as those related to determining that the required good is available on the market, which has the lowest price, etc.
- **Bargaining costs** are the costs required to reach an acceptable agreement with the other party in the transaction, drawing up an appropriate contract and so on.
- **Policing and enforcement costs** are the costs of making sure the other party sticks to the terms of the contract, and taking appropriate action (often through the legal system) if necessary.

In a pretty similar classification, Hobbs (1996) classified transaction costs into three categories which are information costs, negotiation costs and monitoring costs.

- **Information Costs**: almost every firm in industry has to spend money on obtaining information about products, prices, suppliers, buyers and sellers. For example, when the designer prepares specifications which suit the design
and fulfil the requirements of a project, or when the proposal team try to find a price to participate in a bid.

Clarification requests are part of each construction project and can be between different parties involved in the projects for example between the client and contractor, between the engineer and supplier, etc. Since there is no value added in these activities they just increase the transaction cost.

- **Negotiation Costs**: They consist of different expenditures attributed to negotiation such as physical negotiation, preparation of the contract, legal expenses and intermediary costs.

- **Monitoring Costs**: They arise after negotiation and consist of expenses related to inspection of the goods or supervision to service to assure its quality and other requirements which have been set in the contract.

### 3.8.2. Attributes to Transaction Cost

Williamson (1985) investigated reasons for costly transactions and notes that bounded rationality, uncertainty, informational asymmetry and opportunism are necessary characteristics of transactions (also known as behavioural factors). He also identifies the frequency and asset specificity as principal characteristics of TCE (also known as contingency factors).

#### 3.8.2.1. Bounded Rationality

By bounded rationality Williamson means limited rationality. He specifies that ‘firms are incapable of making perfect contracts’, because human behaviour is rational but limited to his (or her) information as well as his capacity for analysing and data processing. For instance a client may choose a supplier for construction material based on available information at the beginning of the project but he proves to be incompetent only during the project execution.

Williamson believes that bounded rationality involves cognitive and perceptive limitations on one side and language limitations on the other. He explains it as:
“The physiological limits take the form of rate and storage limitation on the power of
the individual to receive, store, retrieve and process information without error. 
Language limits refer to the inability of an individual to articulate their knowledge or
feeling by use of words, figures, numbers or graphics in ways which permit them to
be understood by others. Demonstrations, learning by doing and the like are only 
ways of achieving understanding when such language difficulties develop” (Williamson, 1975).

Bounded rationality can avoid setting a proper contingent for probable risks from
the outset and coping with uncertainty which is an important part of contract
management. It can be said that while limited rationality in certainty conditions and
ultimate rationality in case of uncertainty may be tolerated, a combination of
uncertainty and bounded rationality will definitely lead to formation of unforeseen
problems during the execution of a contract (incompleteness of contract).

3.8.2.2. Informational asymmetry
TCE recognises that many business exchanges suffer from incomplete, imperfect or
asymmetrical information. Uncertainty is the situation where all parties in a
transaction face the same, but incomplete, levels of information. Information
asymmetry arises when there is public information available to all parties but also
private information which is only available to selected parties. In this case all parties
in the transaction no longer possess the same levels of information. Informational
asymmetries can lead to opportunistic behaviour in two ways. The first is *ex-ante*
opportunism where information is hidden prior to a transaction. This is known as
adverse selection. The second is *ex-post* opportunism which occurs after a
transaction because of the hidden actions of individuals or firms. These parties may
have the incentive to act opportunistically to increase their economic outcome
because their actions are not directly observable by other parties.

3.8.2.3. Opportunism
Williamson (1979) describes opportunism as ‘self-interest seeking guile’. He explains
that in each transaction there is a risk that people will act in an opportunistic manner
and this risk increases when smaller numbers of organisations are in a bargaining position.

Ghoshal and Moran (1996) support this idea and express that given the occasion firms will act cunningly in order to save their own interest; therefore it is difficult to know who is trustworthy.

For example, with the knowledge that other manufactures are not able to provide a specific material for a project (for any reason) the supplier who can do that may attempt to negotiate a higher price with the client or contractor.

Controversy can be seen in the literature on opportunism. For example, Barney (1990) explains that the difference between opportunistic and non-opportunistic cost is in fact transaction cost while Donaldson (1990) dismisses the idea that managers act opportunistically.

This theory causes a controversial range of reactions among scholars; Williamson himself describes the reactions as:

“It elicits a variety of reactions ranging from abhorrence to easy acceptance to and insistence that this is yet another case where there is nothing new under the sun”.

However he elaborates that although all people do not act opportunistically every time, one should consider the probability. In his words:

“... to the contrary I merely assume that some individually behave opportunistically some of the time, and that differential trustworthiness is rarely transparent ex-ante. As a consequence ex-ante screenings are made and ex-post safe guards are created. Otherwise those who are least principled (most opportunistic) will be able to exploit egregiously those who are more principled.” (Williamson, 1985)

He further points to Niccolò Machiavelli’s (1469 –1527) advice to his prince that ‘a prudent ruler ought not to keep faith when by so it would be against his interest, and when the reasons which made him bind himself no longer exist’ and adds:
“However reciprocal or pre-emptive opportunism is not the only lesson to learn from an awareness that human agents are not fully trustworthy. Indeed, that is a very primitive response. The more important lesson, for the purpose of studying an economic organisation, is this: Transactions that are subject to ex-post opportunism will benefit if appropriate safeguards can be devised ex-ante. Rather than reply to opportunism in kind, therefore, the wise prince is one who both seeks to give and receive ‘Credible Commitments’. Incentives may be realigned and/or superior government structures within which to organise transactions may be devised.”

3.8.2.4. Asset Specificity (or Investment Specificity)
When an asset is durable and dedicated to a transaction it is highly specific. Williamson describes asset specificity as ‘durable investments that are undertaken in support of particular transaction, the opportunity cost of which investment is much lower in best alternative uses should the original transaction be prematurely terminated.’

Asset specificity is a key in selection of governance structure. Transactions usually need high investments in the form of physical and human capital and at the same time require a mechanism for protecting these investments. As Williamson expresses:

“Exclude asset specificity and the world of contract will be vastly simplified, include asset specificity and nonstandard contracting practices quickly appear.” (Williamson, 1985)

He distinguishes four types of asset specificity in transactions:

1. Site Specificity: This is the case when an asset is immobile and after location parties will have to perform a ‘cheek-to jowl’ relation in order to economise inventory expenses. Maybe the best example can be land in construction industry.

2. Physical Asset Specificity: This is the case relating to special machinery and equipment.
3. Human Asset Specificity: Any condition where special experience is needed and personnel become experts by doing particular work for a certain period of time.

4. Dedicated Assets: General purpose investment that would not be made but for the purpose of selling a product to a particular buyer.

Klein et al. (1978) add ‘reputation’ as another form of specific assets, which according to them can work as a guaranty or collateral bond in transaction.

3.8.2.5. Frequency
Frequency describes how often the transaction is repeated between the parties. Williamson defines frequency classes as one-off, occasional and recurrent. He explains ‘some kind of trade off framework is required to examine production and governance cost aspects of alternative modes of organisation’ and a time dimension can be a key factor in economising these costs. He considers that only in recurrent transactions vertical integration can be effectively emerged, but adds that very long duration transactions, due to their time dimension, can have recurring characteristics (Williamson, 1985 and 1978). Also, the more a transaction repeats; expectation of continuity will arise under the shadow of past and shadow of future transactions (Axelrod, 1990).

3.8.3. Transaction Cost Economics and Governance Structures
Transaction cost economics tries to minimise transaction cost by selecting the efficient governance (Williamson, 1985). Governance structure is an institutional framework in which contracts are initiated, negotiated, monitored, reinforced and concluded (Palay, 1984).

According to Williamson, transactions can generally be governed by three different structures: market, hierarchy and intermediate hybrid structure. He proposed a model for selecting the optimal governance structure for six different types of transaction based on asset specificity and frequency (See Figure 3.7).
In a perfect market, market structure can be the most efficient form of governance. Especially when standardisation and mass production are involved and there is no asset specificity (Williamson, 1975). For products which need highly specialised knowledge (investment) which cannot be used in other products and there is no advantage of scale economy, the exchange should be governed within the organisational hierarchy especially when the frequency is high. The hybrid represents a wide range of arrangements which can be categorised into two sub groups: bilateral and trilateral hybrids. The major difference between these two is that trilateral hybrid relies on intervention of a third party for monitoring performance and dispute resolution, whereas bilateral hybrid is based on private problem solving (Williamson, 1998). Trilateral governance is suitable for short term relationships regarding occasional transactions while bilateral hybrids are appropriate for long term recurrent transaction relationships (Williamson, 1985).

Yates and Hardcastle (2003) refer to Master man’s (1992) definition of a procurement system as ‘the organisational structure adopted by the client for management of the design and construction of a project’ and conclude that the ‘governance structure’ and ‘procurement system’ can be used interchangeably in the context of construction industry.

<table>
<thead>
<tr>
<th>Asset specificity</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Occasional</strong></td>
<td>Market</td>
<td>Trilateral hybrid</td>
<td>Trilateral hybrid or Hierarchy</td>
</tr>
<tr>
<td></td>
<td>Purchasing standard equipment</td>
<td>Purchasing customised equipment</td>
<td>Constructing a plant</td>
</tr>
<tr>
<td><strong>Recurrent</strong></td>
<td>Market</td>
<td>Bilateral hybrid</td>
<td>Hierarchy</td>
</tr>
<tr>
<td></td>
<td>Purchasing standard material</td>
<td>Purchasing customised material</td>
<td>Site-specific transfer of intermediate product</td>
</tr>
</tbody>
</table>

Figure 3.7 Modes for choice of government structure (Source: Williamson, 1985)
According to Adler (2001) and Erikson (2006) three governance structures are traditionally related to three different mechanisms: market to price, hierarchy to authority and hybrids to trust.

**Price Mechanism**, by using the equilibrium between supply and demand (i.e. Adam Smith’s invisible hand theory) can adjust transaction (Larson, 1993). Price mechanism can create opportunity and incentives, but it is not effective for transactions of special products.

**Authority** uses ‘visible hands’, while authoritative orders are issued and agents execute them. It is usually known as the process of monitoring and regulating for achieving organisational aims (Larson, 1993). It is a powerful tool for achieving stability and equity but at the same time can decrease participation, motivation and commitment.

**Trust** is like a ‘hand shake’ which adjusts the relation based on structured negotiation between organisations (Larson, 1993). As previously mentioned it can reduce transaction cost, however it is almost always associated with ‘exclusive reliance on a small number of relationships’ which can causes risk and rigidity.

All of these mechanisms have their own advantages and disadvantages, so when used in combination the disadvantages of one can be overcome by the other two. Eriksson (2006) proposes a model for choosing suitable combination mechanisms for different transactions. Following Williamson, he uses frequency and asset specificity as variables and determines the approximate weight of each mechanism by adding them together to create the whole governance mechanism (See Figure 3.8).
3.8.4. Transaction costs and Contracts

Williamson (1986) categorised contracts into three groups: Classical Contracts, Neoclassical contracts and Relational Contracts.

**Classical Contracts** emphasise legal rules and formal documents. He articulates that under classical contract law: (1) the identity of parties to contract is irrelevant; (2) the nature of the agreement is exactly determined, (3) remedies are carefully set and (4) third party’s interference is discouraged. In this type of contracts parties try to foresee all contingencies related to the transaction in the contract.

However, it is not always possible to fit transactions into classical contracts. For instance, in long and complex contracts all future contingencies cannot be identified at the outset, and also appropriate adaptation may not be evident until the situation arises. According to Williamson ‘**Neoclassical Contracts**’ are the best choice for these cases. These contracts are characterised by: (1) gap in their planning; (2) presence of some processes for facilitation of flexibility in the contract; (3) encouraging third party intervention for dispute resolution which can secure completion and continuity of the contract in case of major dispute.
By increase of reoccurrence and asset specificity in the contracts, neoclassical contracts will be no more efficient. Under these circumstances ‘Relational Contracts’ are claimed to be the most suitable type of contract. Williamson identifies three critical dimensions for characterising relational contracts which are: (1) uncertainty; (2) frequency of transaction reoccurrence; (3) degree of idiosyncratic investment (asset specificity).

On this basis, when the transaction does not require special assets regardless of the reoccurrence, market structure and classical contracts are suitable. In such conditions identity of the parties is not important and everything will be based on the terms of the contract. On the other hand, when the investment is mixed and idiosyncratic classical law and market governance cannot ensure the continuity of contract and completion of the transaction, therefore neoclassical governance will be adopted under which third party assistance for dispute resolution instead of pure contact based litigations is foreseen. Williamson calls these structures ‘trilateral governance’.

When the transactions are recurrent the high cost of the special governance structure will be recovered. Under such circumstances Williamson proposed two types of structures: bilateral structure and unified structure (vertical integration). Where investment is mixed, considering economies of scale, outside procurement may be preferred.

3.8.5. Transaction Cost in Construction

Reve and Levitt (1984) investigate formation of contracts in the construction industry from a transaction cost perspective. They identified the triad of client-consultant-contractor as the essence of any construction contract and try to theorise the formation of contracts between them. They believe that the relationship between client and consultant is frequently informal and lacks detail defined formal procedures, which can be known as a professional service contract. A moral relation between parties governs the relationship and social controls of the state and a professional guild protects the relationship. Any violation of trust by the consultant can damage its reputation which is its most valuable asset. They suggest that as this
relation is temporary there is not enough time for the formation of a clan-based relationship therefore it is in the interest of the client to be bound to a professional contract.

However, contract(s) between the client and contractor(s) is usually the result of a bidding process and has largely specifications of a market transaction and rarely can be influenced by results of previous transactions. Due to high asset specificity, clients prefer to monitor the work through their agents or consultant acting on their behalf and this adds an element of hierarchy to the pure market transaction.

The rules of bidding can highly influence the governance structure. In one extreme, when the selection is purely based on price and qualification is perfunctory, the contract is often governed by the terms of the contract (or ‘contingent claims contracting’ in Williamson’s words) under such circumstances neither party tends to compromise in case of dispute as the next project will also be awarded purely based on price. In the other extreme when there are a series of reoccurring transactions or highly specialised facilities which require negotiating contracts and many factors besides price are considered, history of litigations under contract and opportunistic behaviours will be of great importance. To the contrary, a client who is known for slow payment of bills and accepting fair claims will find it difficult in a boom period to find a qualified contractor at a reasonable price. 

Reve and Levitt (1984) suggest that the formation of a clan relationship between consultant and contractor(s) can smooth the implementation of the contract (See Figure 3.9). This long term relationship over different projects and with different clients can develop a set of common values and norms and lead to the formation of a common culture. Such a relationship ‘can exhibit transactional advantages that economise on bonded rationality and reduce the incentives for opportunism’ in complex and uncertain situations.
Winch (1989) challenges Reve and Levitt’s approach for looking at construction projects as economic entities while there are construction firms which makes resource allocation decisions. He suggests that the main question should be why the clients enter contracts for construction rather than building the capacity of performing the job in their own organisation. An analogy of this question with Williamsons ‘make or buy question’ should be considered.

He then raises the question ‘why is there little shift toward hierarchy in the industry?’ and proposes two probable reasons for that: First, existence of powerful market forces pulling in the other direction and second, existence of institutional barriers. He quotes from Ball (1980) that in response to the high degree of uncertainty in the market, contractors shift towards more flexibility rather than more efficiency. This strategy can be seen in a high amount of subcontracting which is in fact transferring risks to subcontractors’ shoulders for gaining maximum flexibility. He argues that such a profit maximising strategy is not necessarily compatible with effective management strategies.

Winch (2001) criticises previous studies on application of transaction cost theory in construction for focusing on a particular transaction (usually between the client and the main contractor) rather than the range of transactions over the project life cycle.
He proposes a two dimensional framework for transaction governance (see Figure 3.10).

**Figure 3.10 Vertical and horizontal transaction governance in the construction project (Source: Winch, 2001)**

The vertical dimension or ‘project chain’ contains direct relations of stakeholders with the client, and the horizontal dimension or ‘supply chain’ consists of deployment of in-house relations or subcontracts for procurement of a good or service. He believes that using such a framework allows us to study the effect of related factors on different transactions in a construction project.

Kumaraswamy and Moitar (2006), express that a totally comprehensive construction contract is impossible to achieve, and even more comprehensive ones are too expensive and time consuming to be prepared. They distinguish between parties to contract’s behaviour in high and low specificity contracts. In the latter there is generally less incentive for continuity of the relationship and as a result parties would not mind if the contract ends in confrontation, under such circumstances parties will stick to their classic contracts. However in the former cases, reoccurrence of the transaction will justify the efforts for keeping a sustainable relationship.

economy in the construction industry and concludes that a high uncertainty and unique relation leads to high transaction costs in construction. She adds that in transaction cost economy self interest is seen as the main motive, therefore the only tool for economising transaction cost is increasing parties’ incentives for cooperation which can be done by: (1) lengthening relations; (2) risk sharing and (3) increasing relative importance of reputation and cooperation skills compared to price in the tendering process.

Kamann (2003) criticises transaction cost theory for ignoring non economical factors such as the history of previous transactions and interpersonal relations. From a similar position Goshal and Moran (1996) believe that Williamson’s theory does not consider the social environment of transaction, however it seems that more recent works which deal with trust and combination of control theory with transaction cost have solved this problem.

3.8.6. Critiques of Transaction Cost Economics

Turner and Simister (2001) oppose Williamson’s position that selection of appropriate governance structure for a project is by definition a transactional cost issue (Williamson, 1996). They believe that the role transaction cost in determining type of projects is not supported by modern practice. According to them if the project pricing terms are to be determined by the transaction cost the out-turn cost of the contract must be independent of the pricing structure. However, as different pricing systems motivate contractors differently the out-run cost will be different under different pricing systems. These differences can be even higher than the difference in transaction costs. They support the position of Levitt and March (1995) that the payment system of the contract must be chosen not to minimise the transaction cost but to incentivise the contractor. Also Simon (1991) as quoted by Kumaraswamy et al. (2008) argues that wealth maximisation is not always the goal even at the highest level of organisations; there is always a potential conflict between the goal of ownership (profit) and the goals of managers. In transactions
firms are represented by their managers who may not be the owners, and that can affect the selection of the type of contract.

Turner (2004) stresses that ex-ante contracts are invariably incomplete and suggests that contracts need to be flexible enough to deal with unforeseen conditions as they arise by providing a flexible farsighted ex-post governance structure that:

- Allows adaptation of mutual agreements.
- Provides a communication structure to identify project problems as they arise so they can be resolved with cooperation.
- Continues to provide incentives to the contractor to deliver client’s objectives.
- Without either party feeling the need to resort to the law (which automatically leads to a lose-lose outcome).

Koskela and Ballard (2006) point out that the novelty of transaction cost in comparison to classical economics is the argument that the buyer shouldn’t select the seller, all things being equal, just based on the price, but by also considering the transaction costs. They found three conceptual flaws in transaction cost minimising as the organising principle of production:

1. Partiality: From the modern production point of view transaction cost economics can be interpreted as minimising only a few cost categories. The question is why project (or production) should be planned just based on minimising a specific type of cost. For planning a project (or production) a systemic view is needed to focus on the general objectives of value maximisation.

2. In practice it is hardly possible to separate transaction cost completely from production cost. The transaction cost behaviour of a supplier often affects
the production cost in indirect ways but this is not considered in transaction cost economics as it is assumed that production cost is constant.

3. The objective of firms is not always to produce at the lowest price, but it is also to continuously improve production. Transaction cost economics has a static view on production, whereas in reality the producer has to take an evolutionary view on production which is beyond transaction cost economics.

They conclude that transaction cost economics cannot be a plausible theory for production however, they stress the value of transaction cost in understanding the phenomena and providing explanations in a purchasing situation.

Kumaraswamy et al. (2008) argue that although transaction cost has been widely used for analysing contracting behaviour of the parties in construction, it seems to be “an inadequate guiding theory” and they suggest MacNeil’s relational contract theory for underpinning contracting.

3.9. MacNeil’s Relational Contract Theory

The issue of a non-legal contract was first expressed by Macaulay (1963). He investigated many industries and found out that contract laws are often ignored in business transactions. As he describes, usually the parties do not use the complete contract when they feel that their counterpart is a necessary part of their business. He states that in relational contracts parties prefer to negotiate and re-arrange the contract in order to keep its continuity rather than terminating the contract.

Beale and Dugdale (1975) confirm the above mentioned concept in their experimental work on businesses and show that parties use expressive words only to mention their primary obligations, while details of their direction is prevailed by tacit planning. According to him reputation and relation is often more important to the parties than contract law.

In MacNeil’s view a contract is an “Instrument for Social Co-operation”. From his early works he states:
“The first thing to note about contract is the fact that it concerns social behaviour... the next thing to note is that the kind of social behaviour is involved in co-operative social behaviour. Behaviour characterised by willingness and ability to work with the others... Contracts involve people affirmatively working together” (MacNeil, 1986).

He believes that co-operation is the most important characteristic of any contract and one of the five basic elements of contracts (he used the terms “Primal Root” and “essence” in some of his later writings):

“There are five basic elements of contracts: (1) Co-operation; (2) Economic exchange; (3) Planning for future; (4) Potential external sanction; (5) Social control and administration” (MacNeil, 1969).

He explains that parties in any contract must have some degree of co-operation otherwise they will not enter into a contract in the first place:

“Contract without the common needs and tastes created only by society in inconceivable; contract between totally isolated, profit-maximizing individuals is not contract, but war...contractual solidarity – the social solidarity that makes exchange work... the minimum holds the parties together so that they will not kill and steal in preference to exchange. This is a matter of external god providing social stability, enforcement of promises and other basic requirements. Within these rigid confines, the parties are free to maximise their individual utilities to their heart’s content” (MacNeil, 1980).

After the presentation of relational contract theory many scholars adopted the theory in different contractual aspects especially in situations in which interdependencies and long term relations are of concern.

MacNeil (1974) believes that classical and neoclassical contract law focus on discrete characters of the contract, and see it as a one spot deal, without paying any attention to the overall environment in which it has been evolved. He studied the contracts from a behavioural perspective; however unlike Williamson (and other economists) he does not involve any particular governance form and concentrates on social environments, surrounding contracts and behavioural norms which exist in any exchange.

According to MacNeil (2000) relational contract theory is defined by these four principles:

1. Each transaction is a part of a complex system of transactions.
2. In order to understand any transaction all aspects of the surrounding relations must be understood.
3. In order to analyse any transaction, essential elements of surrounding relations must be recognised and understood.
4. Combined contextual analysis of relations and transactions are more efficient.

Negotiation and continuous adjustment are one of the important features of relational contracts. MacNeil believes that although written legal contracts can be of great influence, one should check if they are compatible with the current relational circumstances around the transaction. He adds that in the long term complex contracts adjustment clauses in the contract may not be enough, and a continuous dispute resolution can be very voluble (MacNeil, 1974). This aspect will be discussed later in the discussion about flexibility of contract.

In continuation of his works in 1983 MacNeil introduced some common norms in a “positivist sense”, which apply to all contracts. By “norms in a positivist sense” he means that they are norms-in-fact, which is to say that they are observable in operation, to distinguish them from norms in the sense of normative as opposed to positive economics. The more a particular exchange relation is in harmony with
these norms, the more likelihood of the success in terms of its longevity (where appropriate) and the ability of the parties to gain the full range of benefits that the exchange can potentially offer. He also stresses that all economic exchanges are to some degree relational and without such norms there will be wars, not exchange (Oberschall and Leifer, 1986).

1) Role integrity
2) Reciprocity (or ‘mutuality’)
3) Implementation of planning
4) Effectuation of consent
5) Contractual solidarity
6) The ‘linking norms’ (restitution, reliance and expectation interests)
7) Flexibility
8) The power norm (creation and restraint of power)
9) Harmonisation with the social matrix
10) Propriety of means

Later on, he formulated five relational norms and one conventional norm which are only seen in relational contracts:

1) Role integrity
2) Preservation of relation
3) Harmonisation of relational conflict
4) Supra contractual norms
5) Propriety of means

**Role Integrity**
Macauley (1985) first presented this idea that in order to reach the goals, parties of the contract are ready to overcome contractual formalities. This is more significant in relational contracts. A prerequisite for this attitude can be establishment of trust and expecting that the other party is going to fulfil his obligations (Graft and Pierre, 2005). MacNeil (1986) believes that expectations about the counterpart is fundamental to initiation, development and continuation of any relation and more important in the long-term and complex relationships. It can be said that ‘role integrity’ describes long-term behaviour involving multiple obligations and more relational contacts (Prim-Allaz and Perrine, 2000).

**Reciprocity**

Reciprocity is related to the anticipation by each party in a contract that his counterpart will give him something back in the relationship. In other words every party must expect to benefit for their contribution to the relationship. MacNeil in his early works refers to this concept as “mutuality”. According to MacNeil (1986) reciprocity does not call for equality but for some kind of evenness.

**Effectuation of Consent**

Effectuation of Consent refers to voluntary participation in a contract. The core of this norm can be described as a rule according to which the parties’ obligation in a contract is determined by their initial ongoing consent, by commitments undertaken at the beginning of the relationship or later by facts that they obtain from the relationship or results of the relationship. This norm is related to the primal root of “sense of choice” (Austen-Baker, 2004).

**Implementation of planning**

Implementation of planning is related to the parties’ action to determine commitments that are going to be fulfilled in the future by present agreement and planning. Blois and Ivens (2005) emphasise that although very simple transaction planning is an important part of a contract, it can have a more crucial function in the relational contracts.
Flexibility

Flexibility can be assumed as an opposite of “implementation of planning”, while the former deals with how they can pre-define the contract, the latter focuses on the ability of the parties to reconstruct the relationship. It defines close relations with uncertainties and has a much greater importance in long-term relations. It is a tool for parties to resolve their relational conflicts and to continue to play their role in the relationship. According to MacNeil flexibility is a prerequisite for another norm, relational solidarity.

Contractual Solidarity

The term solidarity generally related to trust and confidence (Kumaraswamy et al, 2008). MacNeil calls it the norm that holds the exchange together and defines it as a belief in being able to depend on another. He explains that this norm is of great importance for every contractual relation since in every society individuals are interdependent, and everybody’s behaviour must be according to some ground rules which are accepted by the majority.

The Linking Norms

These are reliance, restitution and expectation interests. Some scholars such as Austen–Baker (2008) believes that these are not really norms, however MacNeil expresses that they are crucial for adjustment of a contract after the initial agreement. When one party gains unfair benefit at the cost of the other party restitution is of great importance, reliance inserts actual bindingness to non-legally binding agreements. According to MacNeil these principles are essential for adjustment of the relations which are undertaken in response to unforeseen conditions.

The Power Norms (creation and restraint of power)

It relates to the formation of one’s power over his counterpart and restraint of it for the benefit of the other party. This norm exists in every contract but is more significant in relational contracts (Prim-Allaz and Perrin, 2000). As Austen-Baker
(2008) puts it, contractual relation and overall cooperative context impose a particular limitation on us to limit our freedom of act and behaviour and give our counterpart right to intervene in the fields of our interest, while at the same time we receive the same rights over hers.

**Propriety of Means**

As MacNeil (2000) defines ‘it is the way relations are carried on as distinct from more substantive matters, including not merely formal and informal procedures, but things such as customary behaviour often of the most subtle kind.’ In other words by entering a relation we have to follow some certain behavioural patterns that suit the social context and the nature of the relation. Though each party has its specific goals they are not free to pursue them by any means.

**Harmonisation with a Social Matrix**

It refers to the fact that the relation has to comply with the overall factors that define exchange in any given context, such as legal mechanisms, communication protocols, and financial systems. According to MacNeil (1983) a social matrix includes everything that is necessary for an exchange to occur. This norm is applicable for both discrete and relational contracts.

**Relational Norms:**

**Preservation of the relation**

As MacNeil explains this norm is the intensification and expansion of contractual stability and includes relations in both individual and collective (organisational) levels.

**Harmonisation of Relational Conflict**

This norm is closely related to preservation of the relation, however MacNeil describes it as a separate relational norm because in complex contractual relations sometimes conflicts exist between internal and external relations; harmonisation of
conflicts is crucial for survival of the relationship. Blois and Ivens (2005) believe that this norm is in relation to a need for flexibility and harmonisation with the social matrix. Regardless of these taxonomies it emphasises the role of dispute resolution and conflict management in relational relations.

**Supracontract Norms**

These norms refer to those norms which are derived from relations and frameworks of a larger system than “mini-societies and mini-states”. These factors are not contractual in nature such as liberty, human dignity and social justice (MacNeil). In Blois and Ivens’ (2005) view they are related to harmonisation with a social matrix.

As MacNeil suggests in discrete exchanges two of the common contract norms, “implementation of planning” and “effectuation of consent” are magnified and merge to form a new norm which he calls “enhancing discreteness and presentation”. By using this term he implies that the exchange is purely discrete and totally planned, hundred percent consented and separated from all else between the participants at the same time as well as before and after. Although such a situation does not necessarily mean that distrust exists, naturally the participants behave selfishly. However MacNeil emphasises that parties do not behave purely opportunistically as the other eight norms still exist although weakened.

Contrarily, with regard to the relational exchanges five norms play the greatest role. Two of them are the same common norms (“role integrity” and “proprietary of means”). While the other three (preservation of relation, harmonizational of relational conflict and supra contractual norms are formed based on other common contract norms as shown in Figure 3.11.

Kumaraswamy et al. (2008) argue that the essence of MacNeil’s theory is drawing attention to a particular type of contract which:

- Involve asset specific or idiosyncratic (i.e. non-transferable) investment
- Are too complex
• Require the parties to re-adjust their obligations and expectations after signing the contract (i.e. ex-post) during the process and at the conclusion.

![Diagram showing the relationship between Discrete Norms, Common Contractual Norms, and Relational Norms for MacNeil's norms and their contribution to discrete and relational norms.](image)

Figure 3.11 MacNeil’s common contractual norms and their contribution to discrete and relational norms (Source: Blois and Ivens, 2004)

They also maintain that these are some of typical characteristics of construction contracts. MacNeil suggests that in this type of contract the long term interests of the parties are better served by cooperation and preserving contractual relationship. In other words, parties should subordinate short-term interests for the sake of long-term interests. Therefore neoclassical contract law is not an efficient way for administrating such contracts, as the focus of neoclassical contracts is on strict compliance to contractual clauses, liabilities and remedies. The inherent complexity of these contracts often causes measurement problems, complication in determination and appointment of liabilities and eventually creation of adversarial relationships. MacNeil initially named these contracts “relational contracts”; later on he referred to them as “complex” or “intertwined” because as mentioned he maintained that all contracts are to some degree relational (MacNeil, 2000). He maintains that contractual norms of role integrity, preservation of relation, flexibility
and harmonisation of relational conflict are of great importance in complex contracts.

3.10. Standard Forms of Contract

The first standard form of contract was published in 1870 under the title “Head’s of conditions of builder contracts” by the Royal Institute of British Architects (RIBA) and London Builders Society. Shortly after that RIBA published its first conditions of contract in 1895 which was the only standard form of contract in use for more than 50 years. That document was revised many times and today’s Joint Contracts Tribunal (JCT) 2005 is one of its derivatives.

In 1945 the first revision of the Civil Engineering Institute standard form was published which was drafted for use with measurements. From 1960 due to an increase in construction work, new forms of contracts were developed. JCT published the prime cost contract in 1967, agreement for minor building works in 1968 and a revised set of contracts in the 1980s.

The Institution of Civil Engineers (ICE) published New Engineering Contracts (NEC) in 1993, which were subsequently revised in 2003. The International Federation of Consulting Engineers (Fédération Internationale Des Ingénieurs Conseils also known as FIDIC) published its first contract in 1950; today it has a full range of standard conditions of contract for construction, design and build, engineering, procurement and construction (EPC/Turnkey) and design, build and operate (DBO) projects. The UK government published GC/works/1 in 1973. The Association of Consulting Architects (ACA) published its first standard contract in 1982.

maintenance and two contracts for home owner/occupier). Around the same time other professional bodies revised their contracts. The ICE published the 3rd edition of NEC (known as NEC3). The ACA published PPC2000 and later on SPC2005 and TPC2005. The Reading Construction Forum also published the ‘Be Collaborative Contract’ (BCC) in 2003.

A great deal of experience has been used in drafting standard forms of contract to avoid pitfalls and uncertain words as much as possible, and to ensure that areas in which words are open to controversial interpretations are covered by case law definitive explanations.

In essence the user of a standard form of contract benefits from the experience of people’s earlier litigations in resolving disputes over the exact obligations that the terms impose. Moreover, third parties such as banks and insurance companies often prefer standard forms of contract as they offer clarity and usually demand a lower premium on these types of contracts. In case each of the parties decided to modify parts of a standard form, they have to ensure that integrity of the document is maintained, considering interdependency and cross referencing of the clauses (Moyses, 1991 and Speaight, 2008).

Taking into account the high level of uncertainty in construction projects and the inherent incompleteness of the contracts, the contract must be flexible enough to be able to cope with uncertainty should it materialise. It must provide an environment of cooperation and mutual agreement. In terms of Turner (2004) the contract needs to provide a flexible, foresighted, ex-post governance structure which:

1. Allows adaptation through mutual agreement.
2. Provides a communication structure to identify project progress and problems as they arise so they can be dealt with in a cooperative environment.
3. Continues to provide incentives to the contractor to deliver the client’s objective.
4. Without any party feeling the need to resort to the law (which automatically leads to a lose–lose outcome).

Transaction cost theory argues for necessity of providing both ex-ante incentivisation and flexible farsighted ex-post governance (Williamson, 1995 and 1996).

**Ex-ante Incentivisation**

Ex-ante incentivisation can be described by three parameters:

- Award is provided to motivate the contractor to share the owner’s objective;
- To associate risk;
- Safeguards provided by the owner to shield the contractor from the risk.

If there is no risk, there is no need for safeguard. If there is risk, there may or may not be safeguard. When there is no safeguard, contractors practically buy off the risk from the client and request higher rewards. In some cases the safeguards only provide protection against extreme risks.

Terms of payment are one of the best tools for providing ex-ante incentivisation.

**Flexible farsighted ex-post governance**

As discussed before, transactional cost economics assert that because of human frailty, rationality is limited and contracts are invariably incomplete. To deal with unforeseen conditions, a flexible, farsighted, ex-post governance is required. Williamson (1996) suggests four parameters for such contracts:
1. the incentive intensity;
2. the ease of making uncontested, bi-lateral adaptations;
3. the reliance on monitoring and related administrative controls (transaction cost);
4. the reliance on court ordering (if required).

3.11. Partnering
During the past decade there was a growing interest in partnering in the construction industry (CII, 1991; NEDO, 1991; Latham, 1994; CRINE, 1994; Egan, 1998). In the words of Luck (1996) “partnering and integration strategies attempt to address a fundamental characteristic of the industry... that it is fragmented, as individuals from different organisations which are geographically and temporally dispersed are involved in the construction process.” As early as the 1960’s different reports pointed to fragmentation in construction projects and indentified it as one of the major problems in the industry (Harvey and Ashworth, 1993). Sir John Egan (1998) states that:

“the rationale behind development of an integrated process is that the efficiency of the project delivery is presently constrained by the largely separated processes through which they are generally planned, designed and constructed. These processes reflect the fragmented structure of the industry and sustain a contractual and confrontational culture”.

According to ACTIVE (1996) “ the confrontation culture which is endemic in the sector has resulted in the development of inefficient business processes, which feed through, as over head to project total cost.”

Since publication of Sir Edward Latham’s report in 1992, partnering has been known as a means for overcoming fragmentation and enhancing cooperation and integration in construction projects (NEDO, 1988; Cox). A considerable body of literature suggests that adopting a partnering approach has improved cost and time

Some of the benefits of partnering which are reflected in the texts are as follows:

1. Project duration can be shortened. Early engagement of the contractor in design can assist in constructability and maximise value engineering which will lead to improvements in both cost and schedule (CII, 1991).

2. Long term relations can cause elimination of the learning curves (Thompson, 1996 and Black et al., 2000).

3. Focus on continuous improvement can cause improvement in both quality and safety (CII, 1991 and NEDC, 1992).

4. Partnering will increase attention to customer needs and his satisfaction, and at the same time enhances better responsiveness to market changes (Bennett and Jayes, 1995 and Bennett et al., 1996).

5. By securing continuity of work, partnering enables parties to deploy their resources more effectively and invest more on research and training (Bresen, 2000).

6. Reduction in the number of disputes and claims between the parties to the contract (among others NEDC, 1992; Latham, 1994; Voyton and Sidiqi, 2004 and Glagola, 2002).

Today partnering has been described as a generic term for a variety of formal and less formal arrangements (Beach, 2005). It is often used as an umbrella word which covers all these cooperative forms of agreement.

It is generally accepted that there is no unified understanding of partnering concept (Nyström, 2005 and Li et al., 2000). Even though much of the literature refers to the Construction Industry Institute’s (CII) definition of partnering:
“Partnering is a long term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant’s resources. This requires traditional relationship to a shared culture without regard to organisation boundaries. The relationship is based on trust, dedication to common goals and understanding of each other’s individual expectations and values. Expected benefits include improved efficiency and cost-effectiveness increased opportunity for innovation and the continuous improvement of quality products and services”.

A major problem with partnering is that there is no universal definition of it, causing confusion and ambiguity about what partnering really is (Glagola and Sheedy, 2002; Chan et al., 2003b). Saad et al. (2002) suggest that partnering is largely misunderstood and not a unified concept as other forms of procurement, which causes major problems for partnering implementation.

After an extensive literature review, Eriksson (2010) categorised definitions of partnering into four different groups:

1. The first group has simple and generic definitions. For instance Chen et al. (2003) describe it as ‘the simple process of establishing good working relations between project parties’, or Bennet and Jayes (1996) state that ‘partnering is a management approach used by two or more organisations to achieve specific business objectives by maximising the effectiveness of each participant’s resources. The problem with these definitions is that they are too general and non-specific and do not give the reader enough information about the main characteristics of the concept.

2. The second group of definitions deal with the main means to achieve partnering and provides more information on the concept of partnering. Among these categories of definitions are: ‘an attempt to establish non-adversarial working relationships among project participants through mutual commitment and open communication’ (Cheung et al., 2003) or ‘a project management approach to enhance project performance through a
transformation of the traditionally confrontational construction culture to one that is based on trust and openness’ (Cheung et al., 2003b). Some of the common characteristics among these types of definitions are joint objectives, trust, mutual commitment, conflict resolution, openness and continuous improvements (Naoum, 2003; Cheng and Li, 2004; Chen and Chen, 2007). These definitions guide the reader on how to achieve partnering, however their drawback is that they mix procedures and tools (e.g. joint objectives and conflict resolution techniques) with their results (such as trust, commitment, openness, etc) or in Eriksson’s words ‘mix apple with pear’.

3. The third group of definitions has been developed recently based on Wittgenstein’s family-resemblance method. They try to provide a universal definition using the content of many definitions. They focus on the components, that is, what partnering consists of. Nyström (2005) found that trust and mutual understanding are the two most important components of partnering and that incentives, teambuilding activities, partner selection, openness, facilitator, conflict resolution techniques, and structured meetings are other important components that have to be present to some extent. Similarly, Yeung et al. (2007) found that the soft components such as trust, commitment, cooperation and communication along with the hard components including formal contract and gain-share/pain-share are the key components of construction alliancing. Other components that have to be noted are early selection of contractors, workshops, joint objectives, continuous improvements, win-win philosophy and conflict resolution techniques (Yeung et al., 2007). These definitions are very similar to the second group though they are more comprehensive and better supported by theories. However, they suffer from the same negative aspect since they too mix procedures and outcomes.

4. The fourth type of definition is based on the theoretical thinking of the third type but not including outcomes of partnering. It recognises that partnering procedures per se does not automatically lead to the outcomes, or even effective collaboration (Bresnen and Marshall, 2000a). The inclusion of
outcomes in a definition makes partnering failures impossible and unfortunately that is what many scholars and practitioners believe too. The logical outcome of such definition would be that any project which does not obtain trust, commitment, openness, cooperation and mutual understanding is not a partnering project. Lu and Yan (2007) give a definition based on a partnering approach (based on procedures) rather than a partnering philosophy (outcomes). They define partnering as ‘a structured sequence of processes initiated at the outset of a project that is based on mutual objectives and utilizes specific tools and techniques such as facilitated workshops, a charter, conflict resolution techniques and continuous improvements techniques.’

Although partnering has been widely adopted in the construction industry all over the world (Chan et al, 2003 and Wood and Ellis, 2005), it is not without critics and it was not as convincing as many of its early scholars would have assumed it would be (Bresnen, 2009 and 2010).

Some researches have found that cooperation and its benefits cannot be easily obtained due to various obstacles when trying to implement partnering in different countries: for instance Chan et al. (2003b) Hong Kong; Akintoye et al. (2000); Saad et al. (2002) and Bresnen (2007) the UK; Glagola and Sheedy (2002) the US; Ng et al. (2002) Australia and Eriksson et al. (2008) Sweden.

Other scholars believe that empirical researches on partnering in construction is still insufficient and much of the work can be criticised for its prescriptive on anecdotal or broad- brush surveys data (Bresnen and Marshall, 2000; Wood and Ellis, 2005; Phua, 2006; Brensen, 2010). Some others note that after two decades of research of partnering the concept is still elusive and its attributable effects on project performance have not been clearly established (Naoum, 2003 and Nyström, 2008).

A highly controversial issue about partnering is whether partnering can be engineered or it should be evolved (Bresnen and Marshall, 2002). Some researchers see partnering as an organic and informal structure which must be developed over time, while others regard it as a more formal relation that can be engineered
(Bresnen and Marshall, 2000). These different views lead to two different attitudes towards the role of contract in partnering. The first group believes that the partnering agreement practically supersedes the contract (ACTIV, 1996; Green and McDermott, 1996 and Cheung et al, 2004), while the second group believes that the contract is a crucial safeguard for preserving the relationship. This controversy is also addressed to by Bygballe et al. (2010). They extensively reviewed the literature on partnering and concluded that key dimensions of partnering are: relationship duration, the relationship partners and how the relationship develops.

**Relationship Duration**

Both literature and practice put more emphasise on project partnering than strategic partnering. The former refers to a specific project which usually has a shorter duration while the latter is about long-term commitment usually over a series of projects (Winch, 2000 and Beach et al, 2005). Some scholars believe that partnering over a project is the first step in reaching strategic partnering (Thompson and Sanders, 1998 and Cheng et al., 2000). Some researchers doubt if partnering is applicable at all in on-off contracts and short-term relations (Beach et al, 2005). Tendering procedures and public procurement regulations often hinder formation of long term relations (Bygballe et al., 2010). Love et al. (2002) argue that in order to foster learning alliance between the parties a long-term relationship is needed because short-term relationships imply individual goals and motives which can hinder development of trust, common objectives and commitment to the relationship. Eriksson (2007) argues that long-term relationships are the ultimate goal as they increase incentives for cooperation. Some researchers have serious doubts as to whether an environment which is often characterised by on-off contracts and short-term gains is really suitable for partnering relations based on mutual trust and long-term collaboration (Bresnen and Marshall, 2000 and Beach et al., 2005).
Relationship development

There are two main theories on formation of partnering among the researchers:

The first group which focuses on formal tools of forming partnering such as selection procedure, team building workshops, TQM, charters, facilitators and measurement and critical success factors for partnering (for instance Elisson and Miller, 1995; Jacobson and Choi, 2008). Bayliss et al. (2004) for instance compare the effectiveness of partnering tools such as workshops, review meetings and incentives in ‘instilling, fostering and maintaining the partnering spirit’. The common aspect between these literatures is that they believe trust and collaboration can be engineered and the partnering is seen as another type of contract (Bresnen and Marshall, 2000). Wong and Cheung (2004) go even further and specify that in contrast to traditional types of trust, construction may instead rely on “system-based trust” i.e. a legally binding agreement and terms where the trust relies on a formalised system rather than personal matters.”

The second group believes that informal aspects such as social dynamics and cultural-structural aspects must be the centre of attention. One of the most influential advocates of this theory is Mike Bresnen (2000, 2001, 2007, and 2010) who believes partnering and trust should be “evolved” (instead of engineered) as a result of interaction between formal integrative mechanisms and social dynamics of the relationship. Similarly Kedefors (2004) maintains that while formal procedures such as team building can facilitate trust in partnering, behavioural and cultural aspects are of greater importance. She sees contract negotiation in contradiction to basic principles of trust in partnering. Black et al. (2000) maintain that partnering should be considered as a gentleman’s promise rather than a contract. Rahman and Kumaraswamy (2004) argue that partnering is a good example of application of relational contract principles which are based on a “dynamic and flexible” contract.

Bygballe et al. (2010) emphasise both formal tools and informal aspects of partnering and support the idea that relationships are a dynamic and complex phenomena which can hardly be achieved by formal procedures alone.
**Relationship Partners**

Most of the literature only focuses on dyadic relationships between the client and main contractor (Bresnen, 2000 and Li et al., 2000). The same pattern can also be seen in practice. Fortune and Setiavan (2005) report that 30% of the 43 clients they interviewed had partnering arrangements with their contractors but they had no such agreement with their suppliers and subcontractors. Some other studies also indicate that while contractors encourage engagement in partnering relations with clients they do not pursue the same approach towards suppliers (Bresnen and Marshall, 2000, Packham et al., 2003 and Akuntyoe, 2001). Humphreys et al. (2003) as well as Daintey et al. (2001) report that suppliers and subcontractors are often sceptical about partnering as they consider partnering to be another way for main contractors to “transfer costs upstream and reduce supplier’s margin”. Akyntoye (2001) believes that due to an aggressive business mentality of the industry and the non-trusting culture, main contractors prefer to pay more attention to clients who provide them with work.

There are also some concerns over the applicability of partner arrangements for a single project or for small projects. An empirical study by Gransberg et al. (1998) shows that projects with a value of over five million USD will benefit more from partnering than smaller projects. Scott (2001) also supports the idea that partnering is more suitable for large scale construction projects and points out that for using partnering over a single project, the value of a contract must be over 150 million USD. Contrarily, Conley and Gregory (1999) propose a systematic model for applying partnering to the project with a value below 3 million USD, however they emphasise that the duration of the project must be over 6 months. It raises the issue of the partnering duration; Lu and Yan (2007) mention that partnering is more suitable for programmes which consist of a series of projects in a row. Likewise Li et al. (2001) express that partnering may not be applicable to a single project as it takes a long time to develop trust. Turner and Simister (2001) suggest that partnering is more applicable in projects with a high level of uncertainty in either process or product.
because it allows them to share the risk efficiently. Lu and Yan (2007) extend this idea and suggest complexity of the project is positively related to the partnering, they explain that complexity is not limited to restriction in time, cost and quality but it also includes function of the project.

There is no doubt that if the partnering concept can change people’s mentality and industry’s culture, it will have a great influence on the reduction of disputes and claims. However, as Hofstede (1980) maintains, culture is a complex and multi face phenomenon that develops over time and through ongoing social interactions among members of a community. These changes cannot be implemented by a formal contract. Partnering along with relational contracting and transaction cost can map the current situation of the construction industry and gives a direction or general guides for reducing claims and disputes.

None of the discussed theories can formulate a panacea for the problem of disputes and claims in construction projects, probably because there are too many variables and uncertainties in these projects. However, all of them together can show us some guidelines for improving the current situation.

3.12. Summary

There is a high level of uncertainty in construction projects; it is apparent that the sources of uncertainties in construction projects are very similar to the causes of dispute which are mentioned in the previous chapter.

Defining the scope of work and terms of payment are two of the important tools client use to deal with uncertainties in projects.

Despite their differences the three discussed theories (transaction cost economics, principal-agent theory and relational contracts) all argue that a classic contract by itself is always incomplete and other non-contractual measures are required to preserve the bond between the parties. That means no matter how detailed a contract is drafted, there is still room for misunderstandings and uncertain
conditions. There is a trend in contract law from classical contracts to neoclassical contracts and then to relational contracts.

There are also lots of publications on partnering and its capacity to change the adversarial environment of construction to a collaborative environment, and prevent disputes. However, there is still no consensus over its definition and some principles of partnering. Some scholars believe that there are not enough empirical works to support this argument.

In the following chapter, claim in projects and contracts role in preventing claims is investigated from complexity science perspective.
CHAPTER FOUR - PROJECT AS A COMPLEX SYSTEM

4.1. Introduction

It is believed that the project management can be aided by taking projects as systems (Remington and Pollack, 2010 and Vidal and Marle, 2008). A system is an interconnected set of elements that is coherently organised in a way that achieves something. Based on this definition a system must consist of: elements, interconnection and a function or purpose (Meadow, 2009).

The complexity science set a new holistic paradigm which maintains that the parts of a system can only be understood in terms of their relationships with each other and with the whole system. In the other words, it is the pattern of the relationships which determines function of a system (Jackson, 2003).

In the management context, complexity theory suggests that due to presence of numerous non-linear feedback loops and sensitivity to the initial setting of the system (i.e. project or organisation), long term planning is impossible. Rigid structures, long term planning, precise task definitions and elaborate rules that accompany them (which are all parts of the contract) are detrimental to the system as they can fix an organisation in perusing a particular vision while the uncertain environment requires flexible responses.

Unlike the traditional views which consider conflict as a noise or pathogen in the project system, from complexity view conflicts are viewed as fluctuation in the ongoing interactions of system elements. This fluctuation is a natural deviation existing patterns, and is neither good nor bad in itself, but it requires accommodation or readjustment. From a complexity perspective conflict in a system is normal, necessary and continues (Andrade et al. 2008).
This chapter starts with definition of complex systems. Then, it shows that construction projects are complex systems and investigates claim from complexity point of view. It continues with discussing on cybernetics as a tool for coping with complexity and finally concludes with application of cybernetics in reducing construction claims.

4.2. System Thinking
As it will be discussed in this section some scholars have claimed that projects in general and construction projects in particular are complex systems. Understanding the characteristics of complex systems can help project managers to cope with the high degree of uncertainty in the projects and adopt the suitable measures to tackle uncertainty. The very first step in understanding complex system would be defining it.

The term “system” is used in many different combinations such as solar system, digestive system or Hi-Fi system. The only aspect which they have in common is that they consist of a group of related entities. Senge (2006) maintains that System thinking is the process of understanding how parts in the system influence one another within the whole, the interrelated action to see the whole pattern of change.

Bertelsen (2005) believes that looking to a system as a whole opens one’s eye to realities which cannot be seen in the traditional methods, reaching this view needs the system in question to be completely understood.

System analysis scholars (such as Pnalva,1997; Boulding,1956; Marle,2002; Vidal et al,2007) define system as an object , which in a given environment, aims at reaching some objectives (teleological aspects) by doing some activities (functional aspects) while its internal structure (ontological aspects) evolves through time (genetic aspects) without using its identity.

Remington and Pollack (2010) as well as Vidal and Marle (2008) and Curlee (2011) argue that projects should be considered as systems. Other researchers such as
Baccarani, 1996; Luckas, 2000; Williams, 1999; Bertelsen; 2004, 2005 and 2006 maintain that construction project are complex systems.

4.3. Definition of Complexity

Klir (1985) noted that oxford dictionary defines ‘complexity’ as:

- Having many varied interrelated parts, patterns or elements and consequently hard to understand fully.
- Being marked by an involvement of many parts, aspects, details, notions and necessitating earnest study or examination to understand or cope with.

and concludes that complexity can be understood by studying:

(1) The number of elements
(2) The number of relationships between the elements.

Yates (1978) believes that complexity arises when one or more of these characteristics are found in a system:

1. Large number of parts or interactions
2. Significant interactions
3. Nonlinearity

Nonlinearity occurs when at least to element of a system are interrelated with nonlinear relations, Nonlinear relations are more difficult to understand, therefore they cause complexity. These kinds of relations are also more difficult to control.

4. Asymmetry

Asymmetry occurs when symmetry in a system’s relationships does not occur. As different elements of system are supposed to do different tasks, the relationships are often differentiated in complex systems.
5. **Nonholonomic constrain**

Nonholonomic constrain. Nomic means law, and holos means wholes in Greek. So it literally means laws of wholes. Holonomic is about integrity of a system. Nonholonomic constraints are constraints of law of wholes. The opposite of this is Nonholonomic constraints. Nonholonomic constraints are when some elements of a system are temporarily out of the central control and do their own thing. This degree of freedom increase the complexity of the system, since behaviour of parts cannot be predicted and consoled based on knowledge of the system.

Stacey (1993) mentions three main attributes of complex systems:

1. Complex systems often produce unexpected and counter-intuitive results.

2. In Complex systems relationship between parts are non-linear and therefore relationships between the causes and effects are distant in both time and space.

3. Complex systems are highly sensitive to many changes but remarkably sensitive to many others.

Baccarini (1996) shows two main dimensions of complexity, using dictionary definitions:

1. **Consisting of many varied interrelated parts.**

   The main pillars of these descriptions are differentiation (variation) and connectivity (interdependence). Melles (1990) in taxonomy of construction projects refers to existence of different skills, phases and interrelations between them.

2. **Complicated, involved, intricate**

   According to Baccarini (1996) this meaning of complexity is open to interpretation and has been explained differently in the literature. Gidado
(1996) considers it at anything that contains elements of difficulty. Wozniak (1993) lists nine difficulty factors such as criticality of project, project visibility and accountability and clarity of scope definition. While these definitions consider complexity as a subjective matter other scholars such as Rowlinson (1988) and Sidwell (1982) believe subjective measures cannot be a relied on. Though they do not reject these definitions, they believe that they cannot be a firm basis for formulation of a consistent and concise standard.

Edmonds (1999) gives a generic definition of complexity:

“Complexity is that property of a model which makes it difficult to formulate its overall behaviour in a given language, even when given reasonably complete information about its atomic components and their inter-relations.”

Vidal and Marle (2008) also define project complexity as follows:

“Project complexity is the property of a project which makes it difficult to understand, foresee and keep under control its overall behaviour, even when given reasonably complete information about the project system. Its drivers are factors related to project size, project variety, project interdependence and project context.”

According to Marle (2002) and Genelot (2001) cited by Vidal and Marle (2008) complexity is a property of a system that causes on one hand the emergence of new properties that none of the elements of system owns, and on the other hand acceptance of unpredictability of the system.

Some other authors who also worked on characteristics of complex systems are Waldrop (1992), Kaufman (1995) and Lewin (1999). However one of the most complete work is probably done by Lucas (2000) who listed 18 characteristics of complex systems:

1. **Autonomous Agents:** Complex systems are generally composed of independent or autonomous agents. All of these agents are equally valuable in
the operation of the system. There is no central or external control in the
system. Therefore any control structure (power asymmetry) must emerge by
self-organisation and cannot be imposed.

2. **Nonlinearity**: Complex system outputs are not proportional to their inputs.
This means that reductionist superposition (i.e. the idea that \( F(x+y) = F(x) + F(y) \)
and that \( F(ax) = aF(x) \) ) is not valid in this nonlinear science. Therefore taking
the properties of each part and putting them together will not give a valid
solution to overall fitness. In the other word the whole is not equal to the sum
of the parts.

3. **Emergence**: The system properties are not describable in terms of their
parts, they are higher level functions of the system. These functions or
properties will not even be describable using the language applicable to the
parts only, and are what is called 'Meta-System Transitions' or evolutionary
transitions. They comprise forms of synergy or cooperation that passes the
simple ideas of “aggregation” used in reductionist science.

4. **Downward Causation**: Along with the traditional form of upward causation
(the parts creating the whole) we have also downward form in complex
systems a. This means that the existence and properties of the parts are
affected by the emergent properties (or higher level systemic features) of the
whole, which form constraints or boundary conditions on the freedom of the
constituents. For instance, a human determines the fate of his cells (by his
actions and lifestyle) as much as their functions determine his. This two way
structural interplay is common in complex systems.

5. **Attractors**: Self-organization relates to the presence in the system of
dynamical attractors. Each attractor will occupy a relatively small area of
overall state space. The system will thus be expected to contain multiple
alternative attractors (areas of stable operation - concurrent options or
'choices'), giving several different possible behaviours for the same system.
Which actually occurs will depend upon both the initial configuration and the
subsequent perturbations and transients (the system history). This compares to conventional science where history is discarded.

6. **Fitness**: The distribution of choices or optima around state space can be modelled by the concept of a fitness landscape. Here the height of the hills relates to how good the option is (this landscape is contextually dependent). Unlike conventional ideas, we are looking here at all the possibilities open to the system and not just the current actuality.

7. **Co-evolution**: The parts are regarded as evolving in conjunction with each other in order to fit into a wider system environment, thus fitness must be measured in contextual terms as a dynamic fitness for the current niche, and not in relation to any imposed static function. The part structure will correlate to an external environment (giving a contextual fitness by structural coupling). This dependence upon environment contrasts with the isolated treatments of conventional science.

8. **Non-Equilibrium**: These systems operate far from equilibrium since they are dissipative (i.e. they take energy from their environment to maintain the far-from-equilibrium position). Energy flows will drive the system away from an equilibrium position and establish semi-stable modes as dynamic attractors. This relates to the metabolic self-sustaining activity which in living systems is usually called autopsies. These active systems reduce local entropy whilst exporting it to the environment, unlike conventional passive systems.

9. **Non-Standard**: Complex systems contain structures in space and time (thus are heterogeneous rather than the homogeneous assumption from conventional science). Their part freedoms will allow varying associations or movement, permitting clumping and changes over time, thus initially homogenous systems will develop self-organizing structures dynamically (therefore order increases over time rather than decreasing as expected in conventional thought).
10. **Non-Uniform**: These parts are non-equivalent (thus each can obey different rules or local laws - rather than all behaving the same under the global laws of conventional science). Each part evolves separately, giving diversity in rule or task space. The mix of rules (learning) that occurs will depend upon the system's overall contextual co-evolution.

11. **Phase Changes**: Feedback processes lead to phase changes, sudden jumps in system properties. These 'edge of chaos' states are critical points in connectivity terms and the system is maintained at the phase boundary by its self-organising dynamics - very different than the either/or phases of conventional systems. At this point a power law distribution of properties and perturbations occurs in both space and time. These systems exhibit the self-similarity of fractals, but in a statistical rather than an exact way.

12. **Unpredictability**: In such interacting systems a chaotic sensitivity to initial conditions can occur (the butterfly effect). Trajectories differ, some show this divergence in state space from nominally similar inputs, others show convergence to an attractor. This is a feature of the mix of attractors typically present at that point (unlike the single attractor of equilibrium dynamics).

13. **Instability**: Over the long term stepped evolution or catastrophes will exist (similar to punctuated equilibria). Sudden swaps between attractors become possible as the system parameters approach the boundaries of the attractors. Evolution thus is expected to operate in steps rather than gradually, with the wild swings in co-evolutionary balance often associated with perturbations to ecosystems being seen. The steady state models of conventional science are rather different.

14. **Mutability**: Random internal changes (mutations) or innovations typically occur in these systems. New configurations become possible due to part creation, destruction or modification. This relates to changes to the structure of state space, which must be regarded as dynamic, not static and does not conserve world lines as in conventional science, here they may bifurcate and merge over time.
15. **Self-Reproduction**: Usually these systems have an ability to clone identical or edited copies (growth). Even social systems can replicate to create additional systems (e.g. organizations or franchises). Copying errors (including mutations, recombination or insertion) permit new system structures to become available, allowing open ended evolution and self-generation (autocatalysis). This discards the fixed-in-time assumption of most science.

16. **Self-Modification**: Parts can change their associations or connectivity freely - either randomly or by evolved learning procedures. Thus the system can be regarded as redesigning itself over time, as far as proves necessary to maintain or change function within its operating context. These internally generated system changes are missing from most scientific viewpoints, which assume instructional changes.

17. **Undefined Values**: The meaning of the system's interface with the environment is not initially specified and this must evolve. This requires that semantic values or communications are created dynamically (or constructed) by the system as a result of environmental interaction and are not simply a direct reflection (mapping) of the external world (as usually assumed). This is contextual (constructivist) semantics rather than an absolute view of external truth.

18. **Fuzzy Functions**: The overall system function is thus not initially known, but is created by co-evolutionary methods. This relates to combinations of the emergent values creating an implicit theory of operation, in which sharp dualist classifications are unavailable and probabilistic matching between system and environment must suffice. This is a fuzzy functionality very different to standard bivalent logic.

Bertelsen (2005) divide these characteristics into three main groups and shows that these three dimensions are present in construction projects. Fernandez-Solis (2008) also suggests a paradigm shift and using complexity science in managing construction project to overcome “significant differences between expectations and results”.
Remington and Pollack (2007) list eight characteristics for complex systems:

1. **Hierarchy**: Each system consists of several subsystems and is a part of a bigger system itself. This is sometimes known as nested behaviour, like Russian Babushka dolls which is one inside the other.

2. **Communication**: Information about the state of system is passed between the elements of the system.

3. **Control**: Usually systems maintain the stability relationships between their parts and so maintain their existence. It can be claimed that control is the essence which put a system together. It also maintains a stable state for operation of system.

4. **Emergence**: At a certain level of system some different properties emerge which cannot be seen from the level below. These properties are the result of stable interaction between the parts not of any part itself.

5. **Phase transition**: A complex system can change and take a new form in response to change in external condition. The system is the same, but it shows different characteristics. For instance when a navy vessel goes from normal condition to battle condition, people are the same, but the relations between them changes and as a whole they function differently.

6. **Non-linearity**: Complex system outputs are not proportional to their inputs. This means that reductionist superposition (i.e. the idea that \( F(x+y) = F(x) + F(y) \) and that \( F(ax) = aF(x) \)) is not valid in this nonlinear science. Non-linearity is caused by “positive feedback” and it must be distinguished from “control” which is induced by “negative feedback” to maintain stability in the system.

7. **Adaptiveness**: Complex systems respond to changes in environment, to accommodate and take advantage of the change for maintaining or improving themselves. Simple control maintains the system against a reference point. However in adopting the reference point can move itself.
System adaptation can be in response to variation in critical resources, change in external boundaries and limitations and appearance of new possibilities. For instance by changing rules and regulations the companies which can adopt them with the new environment will survive.

8. **Sensitive dependence on initial condition**: This is the famous “butterfly effect” first expressed by Dr. Edward Lorenz in 1972. It maintains that even a small difference in the initial situation of a complex system (such as flipping wings of a butterfly in Brazil) can produce an unpredictable or even catastrophic effect (like a hurricane in Texas). In project context Contract plays the role of the initial setting, the risk which are considered or missed in the contract can influence a lot in the process of the project and behaviour of the system (stake holders).

Despite all works on characteristics of complex systems distinction between a complex and simple system is not an easy task as we still do not have universal measures which can establish degree of complexity in a system (Edmonds, 1999 and Gershenson and Heylighen, 2005). In the words of Reggiani and Nijkamp (2009) “complexity is itself a very complex notion.”

Despite all controversies on definition of complexity what we can say for sure is: by increasing the number of definite components, the number of connections between them, the complexity of components themselves or the complexity of connections complexity of any given system will increase (Gershenson and Heylighen, 2005).

4.4. **Complexity and Dispute**  
As mentioned in chapter two conventional management theories consider conflict as a failure or dysfunctional phenomena and tries to reduce, eliminate or overcome it (for instance see Pondy, 1976; Deutsch, 1968 and Rahim, 2002). Love et al. (2008) proposed the pathogen concept and used the Swiss cheese model to show the presence of defects in projects structure and try to clad it in away to avoid their exposure to the environment to prevent disputes in projects.

Contrarily, complexity theory maintains that formation of conflicts in complex systems is normal, continuous and inevitable. As Andrade et al. (2008) maintain from
complexity perspective conflict is fluctuation in the ongoing interactions of system agents. A fluctuation is a naturally occurring divergence from the existing pattern, which by itself is neither good nor bad; however the system requires readjustment after a fluctuation.

Jackson (2003) also emphasize on importance of flexibility in complex projects and maintains that in the management context, complexity theory suggests that due to presence of numerous non-linear feedback loops and sensitivity to the initial setting of the system (i.e. project or organisation), long term planning long term planning is impossible. He argues that that long term planning, rigid structures, precise task definitions and elaborate rules that accompany them (which all are parts of the contract) are detrimental to the system as they can fix an organisation in perusing a particular vision while the uncertain environment requires flexible responses.

From complexity perspective systems are made of local agents (either individuals or groups) who function both independently and interdependently. These agents operate continuously and follow the rules and patterns of the system. Over the time, these agents pay attention to feedbacks and learn to adapt their actions. Therefore any interference, breakdown or disruption which is tagged as “conflict” in traditional management is seen as natural occurrence of fluctuation that cause interdependent agents make interpretation and adopt their behaviour.

Wheatley (2010) argues that many fluctuations which are traditionally seen as disturbance or imbalance in the system are not necessarily detrimental to the organization’s function, as they are primary source of creativity and energy for the system.

4.5. Adaptation and Readjustment in Complex Systems
Considering the intrinsic unpredictability of the complex systems, different measures have been taken to cope with them. As Holland (1995) maintains, it is widely accepted that working within such systems surprises, errors and problems are natural to occur. However we can always adopt our actions to the new situation or reconfigure the system in order to cope with it.
According to Heylighen in order to adapt to any change, either anticipated or unanticipated, any deviation between the actual and desired situation must be compensated.

Different methods for adaptation have been proposed in cybernetics (Beer), artificial intelligence (Russel and Norvig, 1995), neural network (Rumelhart et al., 1986), multi-agent systems (Wooldridge, 2002), Chaos control (Chen and Yu, 2003) and many other disciplines.

Other readjustment and adaptation methods which are suggested in project management to cope with high uncertainty of complex systems are:

- Effective communication (PMI, 2004)
- Flexibility in contract (Bettis and Hitt, 1995; Shenhar, 2001; Floricel and Miller, 2001; Branconi and Loch, 2004 and Ariely, 2011).
- Fairness and early warning system (Kim and Mauborgne, 1997)
- Open ended contract (Loch et al., 2006)

In this research cybernetics and its application in project management is discussed in more detail.

4.6. Cybernetics

The term “cybernetics” has been derived from the Greek word kybernetes which means “steersman”. Historically it has been used by Plato in the ancient times and by Ampere in the 19th century who both saw it as the science of effective management. In 1948 Norbert Weiner published a book titled “Cybernetic the Study of communicating and Control in the Animals and the Machine”. Between 1944 and 1953 a series of inter disciplinary meetings have been held on cybernetics during which the topic broadened from controlling animals and machines to social systems (e.g. works of Stafford Beer in management) and minds (e.g. works of Bateson and Ashby).

In the post war era control engineering and computer became fully independent fields and the remaining cybernetics distinguished itself from these mechanistic
approaches by focusing on self organisation, cognition and role of observer in modelling a system. Since early 1970s this branch is known as second order cybernetics (Heylighen and Joslyn, 2001; Beer, 2004).

Cybernetics has been defined in a variety ways, by people from a variety of disciplines. Richards et al. (2008) present a list of these definitions:

Table 4.1 Definitions of cybernetics (Source: Richards et al., 2008)

<table>
<thead>
<tr>
<th>Definition</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>A science concerned with the study of systems of any nature which are</td>
<td>A.N. Kolmogorov</td>
</tr>
<tr>
<td>capable of receiving, storing, and processing information so as to use it</td>
<td></td>
</tr>
<tr>
<td>for control</td>
<td></td>
</tr>
<tr>
<td>The science of control and communication in the animal and the machine</td>
<td>Norbert Wiener</td>
</tr>
<tr>
<td>The art of securing efficient operation</td>
<td>L. Couffignal</td>
</tr>
<tr>
<td>The art of steersmanship; deals with all forms of behaviour in so far</td>
<td>W. Ross Ashby</td>
</tr>
<tr>
<td>as they are regular, or determinate, or reproducible; stands to the real</td>
<td></td>
</tr>
<tr>
<td>machine—electronic, mechanical, neural, or economic—much as geometry</td>
<td></td>
</tr>
<tr>
<td>stands to a real object in our terrestrial space; offers a method for</td>
<td></td>
</tr>
<tr>
<td>the scientific treatment of the system in which complexity is outstanding</td>
<td></td>
</tr>
<tr>
<td>and too important to be ignored.</td>
<td></td>
</tr>
<tr>
<td>A branch of mathematics dealing with problems of control, recursiveness,</td>
<td>Gregory Bateson</td>
</tr>
<tr>
<td>and information</td>
<td></td>
</tr>
<tr>
<td>The science of effective organization</td>
<td>Stafford Beer</td>
</tr>
<tr>
<td>The art and science of manipulating defensible metaphors</td>
<td>Gordon Pask</td>
</tr>
<tr>
<td>A way of thinking; the art and science of maintaining equilibrium in a</td>
<td>Ernst von Glasersfeld</td>
</tr>
<tr>
<td>world of possibilities and constraints</td>
<td></td>
</tr>
</tbody>
</table>

As it is shown, control and maintaining equilibrium are the repetitive theme in all of these definitions.

4.6.1. Regulations

Cybernetic scholars as sited in Stacey (2006) argue that organisations use regulators to reach their goals and remain in the desired state (i.e. stability) in relation to their environment and maintain stability in their system despite the variations in the environment. Regulators often use negative feedback to keep a system in stable state.
4.6.2. Feedback

According to Stacey (2006) feedback describes the situation when output an event in the past will influence an occurrence or occurrences of the same event / phenomenon in the present or future. Feedback is a dimension of system thinking. It consists of information, responses and reflections on output, performance of tasks, products, etc. Ramaparasad (1983) defines feedback as information about the gap between the actual and the reference level of a system parameter which is used to alter the gap in some way.

There are essentially two forms of feedback: negative feedback and positive feedback. Kuhn (1975) distinguishes between positive and negative feedback and maintains that if the action which is triggered by a feedback widens the gap between the reference and actual levels the feedback is called positive feedback, and if the action reduces the gap between the levels the feedback is called negative feedback.

Lyneis and Ford (2007) maintain that system dynamic is one the most successful models for managing projects. Project performance is usually measured in terms of schedule, cost, quality and control. Management actions to control the project’s performance are modelled as effort to minimise the difference between the target and performance in one or more of performance dimensions.

As cybernetic is science of control and management is profession of control, regulators have a distinguished role in both. Ramaparasad (1983) notes that feedbacks serve different purposes in organizations such as stabilization, growth, change and growth.

In project management context cybernetic has been used in investigating project finance (Dobre, 2007), development of trust in inter-organisation relationship (Oliver and Montgomery, 2001), Organisational behaviour (Ericson, 1970).

Ashby (1956) distinguishes between two different types of regulators: error-controlled regulators and anticipatory regulators.
4.6.3. Anticipatory Regulation

If we use a regulator which can sense the disturbance before the disturbance hit the system we are taking anticipatory action, such action will reduce the disturbance of the outcome. In Figure 1, D resembles environmental disturbance, T is impact on the system, leading to outcome (E) and R shows regulator.

![Figure 4.1 Anticipatory regulations after Ashby (1956)](image)

In construction industry contract plays the role of an anticipatory regulation. Contract documents such as project plan, specifications, etc. define the position project must be in at any time by showing the expected progress, expected earned value, and required quality.

If the contractor fails to complete the project within the defined time span with the set budget and desired quality or if the client does not fulfil his obligations, the contractual clauses are expected to work as a regulator to maintain the project organisation, and adjust behaviour of the parties to the contract.

In other words contract is drafted before the commencement of the project and trying to foresee all problems that may happen during the project life cycle and between the project parties to help the parties solving their problems based on the contract and continue their relationship.
4.6.4. Error-controlled Regulation

However, it is not always possible to establish anticipatory regulators. Sometimes anticipatory regulator exists but during the process it proves to be insufficient. Under these circumstances an error-controlled regulator is put in the system. Figure 2 below shows how an error-controlled regulator works.

Probably the most common example of these regulations is monitoring, reviewing and then corrective action cycles in systems or organisations. In the context of project management regular meeting between the client and contractor(s) for the purpose of monitoring projects can function as error-controlled regulator.

![Diagram showing error-controlled regulations after Ashby (1956)](image)

According to Stacey (1993) there is no doubt that anticipating disturbance is the more preferable method when it is possible. In using error-control regulators there are time lags in:

1. detecting what is happening
2. deciding what should be done
3. performing the decision
4. Materialisation of the outcome
These time lags mean the disturbance will remain in the system for a while, reduces its performance and makes it unstable. However anticipating disturbances relies on ability to predict errors and design a regulator to resolve them.

Stacey (1996) maintains that for successful control of a system both anticipatory and error-controlled regulation must be present.

4.6.5. Requirements of Cybernetic Control
Gershenson and Heylighen (2005) argue that feedback control requires that one has a wide enough range of counteractions in his disposal (requisite variety), and knows what action to take to neutralize a certain event (requisite knowledge). Cybernetic rule of requisite variety maintain that to keep a system in stable state the huge number of disturbances must be neutralized by equally huge number of regulators so that they can cancel each other out and provide a single desired situation. As one can never predict what will happen and when, the general rule of cybernetic is maximising the diversity of possibilities. However Gershenson and Heylighen (2005) suggest that in order to react quickly and properly it is good to have at least an expectation of what can happen and which reaction would be appropriate. These expectations are often subjective and based on the experience. Documented lessons learned and other organisation learning techniques (See chapter two) can help to enrich these expectations.

4.6.6. Cybernetics and Causality
Cybernetics scholars (such as Ashby, 1956; Gershenson and Heylighen, 2005) argue that to control a system (organisation) it is not necessary to understand the internal feedback structures of the system and the surrounding environment. Instead it is of outmost importance to study the impact of a particular disturbance on the system and also the response of the system to that particular disturbance. In the ideal case that regulators have the same variety as disturbances varieties, any disturbance will receive response in the same way.

Due to complexity of the systems one may not be able to determine the exact response to a certain disturbance, therefore some responses may be too strong or
too weak. However the deviation from the required responses should be cancelled out.

One can claim that cybernetics is the approach that seeks to control organization by using feedback without understanding the feedback structure of the organisation itself. The result is stable behaviour, predictable in terms of probabilities of specific events and time.

Such approach can be very practical in controlling complex systems in which various autonomous and independent agents are involved and causations are often not clearly known. As mentioned in chapter two scholars such as Fenn (2002) and Love et al. (2008) challenge the validity of researches on causes of claims in the construction industry. Looking from the cybernetic perspective to this problem, causes of dispute are not that important, instead variation from plans and mechanisms for undoing them are the main concern.

As Kelly (1994) pointed out the novelty of cybernetic approach is its relying on observation. Regardless of complexity of a system and its components and their interrelations, as far as we have a way to counteract the deviation the causality will be irrelevant.

It is generally accepted that we cannot fully predict and control the behaviours of a complex system. It is only natural to face errors, surprises and problems in dealing with such systems. However one can always adopt his behaviour with the new situation to cope with the unexpected events (Carlos Gershenson, 2007).

4.7. Summary
In the context of contract management, existence of client, design contractor, construction contractor, suppliers and other stakeholders with different goals, different mindset, different cultures and complex relation between them, interconnectivity between activities, etc. make a highly uncertain environment which is susceptible to disputes and claims (factors that can cause dispute and claim has been discussed in detail in chapter two).
Traditional schools of management consider dispute pathologic, a noise in the system, disturbance, etc. and have been tried to prevent or reduce disputes in projects over years.

On the contrary, from complexity perspective conflicts are seen natural occurring in projects as complex systems. Any effort to predict or prevent conflicts is doomed as conflict is nothing but the fluctuation in the ongoing interactions of system agents.

Projects as complex systems are unpredictable and rigid contracts can damage the system as its requirements may vary during the project execution. Instead of conflict prevention, establishment of early warning systems that can alert the parties to contract of the conflict and let them rearrange their relationships seems more efficient. Cybernetics calls it an error controlled regulator.

This dose not diminish the role of contract, because the contract forms the initial setting of the system (project) and complex systems are extremely sensible to their initial setting.

As it is discussed in chapter three and eight, similar recommendations have been made for flexibility in contracts, warning systems and communications in others area of project managements.

Looking at project management from cybernetic perspective, the stable state is the condition which is defined in project schedule and contract. Any deviation from this condition can cause conflict between the client and contractor(s). The contractual clauses function as anticipatory regulations which try to return the system to it desired position should any deviation between the actual and desired stated are observed.

Cybernetics maintains that no matter how well defined anticipatory regulators are they are not enough to keep a system in the desired state. The same goes for contracts. As it has been shown in this research using relational contracting and transactional cost economics theories, contract cannot prevent conflicts by itself.
Cybernetics suggests that an error controlled regulation must be present alongside anticipatory regulations. In construction effective communication between the client and contractor in forms of routine site meetings and dispute review boards can play the role of error controlled regulations. These mechanisms are not in the scope of this research.

Considering complexity of construction project (specially the major projects) it will be very difficult to avoid rising the conflict in all these five areas. However it is much easier to monitor divinations from contract. In the standard forms of contract concepts such as change order (i.e. variations), notification, etc. plays the role of feedback.
5.1. Introduction
This chapter starts with definition of research methodology and research method, then it deals with research philosophy and different research paradigms are discussed. Consequently different research dimensions such as research data, research reasoning and research perspective are defined and position of the research is defined. Finally methods which are used and the sequence of works are explained.

“Research methodology” and “research method” are often mixed up and used interchangeably. Presenting a clear definition can help to clarify the methodological aspects. Research methodology refers to principles and procedures of logical thought process that are applied to a scientific inquiry, whereas research methods are the tools for such inquiry (Fellows and Liu, 1994). Therefore within a research methodology different research methods (i.e. tools) may be used to answer the research questions. Research methods can be discussed at three different levels: philosophical, reasoning and data.

5.2. Research philosophy
In choosing a viable methodology for the research, researcher needs to ensure if the methodology matches the research paradigm. Thomas Kuhn’s (1922-1996) in his book ‘The structure of Scientific Revolution’ suggests for the first time that paradigm can summarize researcher’s belief about his effort to create knowledge. However the problem is that Kuhn does not propose a clear cut definition for ‘paradigm’ and uses this term in 20 different ways in his book, this lack of clarity in definition caused a long discussion and eventually forced him to add a postscript in the second edition of his book (Masterman, 1970). Despite this ambiguity most scholars highlight the
concept of “worldview” in their definitions of paradigm. For instance Cresswell (1998) states “qualitative researchers approach their studies, with a certain paradigm or worldview, a basic set of assumption that guides their inquiries”, or Lincoln (1994) describes paradigm as “alternative world views with such pervasive effect that adopting a paradigm can influence every aspect of a research”. Hirschheim et al (1989) explain paradigm concept as a set of basic beliefs (or metaphysics) that deals with knowledge, how to acquire it, and about the physical and social world and gives a worldview which defines for it’s a holder the nature of the world, an individual’s position in the world and different possible relations between the parts of the world.

It is generally believed that these beliefs (i.e. paradigm) are so basic that there is no way for proving their correctness or rejecting them; therefore they have to be accepted as a faith.

Guba and Lincoln (1994) developed a system for comparing different paradigms and suggest that researchers’ respond to three fundamental and interconnected questions can define their inquiry paradigm. These questions are:

1. **The ontological question**: What is the form and nature of the reality?

2. **The epistemological question**: What is the nature of knowledge? How is knowledge acquired? Is it truth, belief, and justification?

3. **The methodological question**: What is the best approach to acquire the desired knowledge?
Table 5.1 Comparison of main research paradigms (after Guba and Lincoln, 1994)

<table>
<thead>
<tr>
<th>Item</th>
<th>Positivism</th>
<th>Post-positivism</th>
<th>Critical Theory</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td>Realism</td>
<td>Critical realism</td>
<td>Historical realism</td>
<td>Relativism- local and specific constructed realities</td>
</tr>
<tr>
<td>Epistemology</td>
<td>Dualist- Objectivist</td>
<td>Modified dualist / objectivist</td>
<td>Transactional/ subjectivist</td>
<td>Transactional/ subjectivist</td>
</tr>
<tr>
<td>Methodology</td>
<td>Experimental/ Mainly quantitative methods</td>
<td>Modified experimental/ may contain qualitative methods</td>
<td>Dialogic/ dialectical</td>
<td>Hermeneutical/ dialectical</td>
</tr>
</tbody>
</table>

Table 5.1 summarises the main paradigms and their responses to the three fundamental questions. The four main paradigms are briefly explained below:

1. **Positivism:**

   **Ontology:** An independent reality exists which is derived by natural laws and mechanisms.

   **Epistemology:** A positivist is objectivist and believes that researcher can study the object without influencing it or being influenced.

   **Methodology:** A hypothesis is stated in proposal at the beginning of the research and it will be subjected to empirical tests for verification. Research conditions must be controlled to avoid influencing the outcome.
2. Post-positivism:

**Ontology:** The reality is partly apprehendable because of the flawed human intellectual mechanisms and intrinsic intractable nature of phenomena.

**Epistemology:** Objectivity is considered as a regulatory ideal; and external guardians of objectivity such as editors, referees and professional peers are used to make sure the findings feet the pre-existing knowledge.

**Methodology:** Modified experimental manipulation, in which more emphasize is put on situational information and discoveries are reintroduced as an element into the inquiry. In social sciences this approach crystallizes in asking for emic view points that can assist researcher to understand meaning and purposes that people ascribe to their actions. This aim can be largely accomplished by utilizing qualitative methods.

3. Critical Theory

**Ontology:** Historical realism. It maintains that over the years specific structures will be made in people’s mind which is also influenced by their political, cultural economical and ethic factors, and now these structures are inappropriately taken as reality.

**Epistemology:** Transactional and subjectivist. Investigator and the object of the investigation are assumed to be interactively linked, and values of the investigator will inevitably influence the inquiry.

**Methodology:** Dialogic and dialectical. The transactional nature of the reality requires a dialogue between the researcher and the object of the research, and the dialogue should be dialectical in nature to transform the ignorance and misapprehension (accepted structures) to more informed consciousness.

4. Constructivism
Ontology: Relativist; It maintains that realities are apprehend able in the form of multiple mental constructions. The constructions are influenced by individual’s social and experimental background and are local and specific in nature. However there are shared elements between the people with commonalities. These constructions are not more or less true, but simply more or less informed or sophisticated and they are alterable.

Epistemology: Transactional or subjectivist; Investigator and the object of the investigation are assumed to be interactively linked and findings are created as the research proceeds.

Methodology: Hermeneutical and dialectical; It is believed that individual constructs can only be elicited and refined by interaction among and between researchers and respondents. Traditional hermeneutical techniques are used for interpretation of varying constructions and compare and contrast them to reach to a consensus construction which is more informed and sophisticated than any predecessor.

Some scholars such as Burell and Morgan (2000) believes that paradigms have a continuum while others such as Tashkkori (2003) believes in fixed boundaries between paradigms or ‘paradigm incompatibility’ in his word and even believe that qualitative and quantitative methods cannot be combined.

Burrell and Morgan (2000) use the terms positivist and anti-positivist (instead of post-positivist) to explain the same concept. In their definition the positivist approach seeks to explain and predict what happens in the social world by looking for regularities and casual relations between the elements of a system. Whereas Anti-positivist approach is in general against the utility of searching for laws or underlying regularities in the social sciences. It believes that the social world is relativistic and can only be understood from point of view of people who are directly involved in the activities under the study. It maintains that you cannot understand a social system by just ‘observing’ it, but you should ‘occupy the frame of reference of
the participant in the action’. In the other word social systems must be studied from
the inside rather than the outside, and social studies are essentially subjective rather
than an objective.

Anti-positivism is sometimes known as “interpretivism” and “social action
approach”. It has been put forward by Max Weber and other German social scientist
in the 19th century, they believed that natural sciences and social/cultural events
shall be treated differently. While natural sciences are concerned with finding casual
explanations for external events, human sciences are concerned with grasping the
meaning of individual’s experience. They called their new approach “Vrestehen” (the
German word for understanding) at the time (Hayes, 2000).

Kuhn (1962) maintains that history of science is the history of rising and falling of
paradigms. In some periods of time there is a dominant paradigm which rejects any
research based on other paradigms, and in some periods different paradigms are
competing at the same time. He also rejects the claims that science obtains
knowledge in a purely objective way based on facts and without influence of
judgement, and argues that examination of history shows that scientists have been
always under influence of social and political powers, and the scientific knowledge is
produced within a prevailing paradigm which determines what research to be done
and how it conducted.

5.3. Research reasoning
Reasoning or logic of the research is another important factor which should be
considered in setting research methodology. It refers to the role of the existing body
of knowledge and existing literature and correlation of the gathered data (by the
researcher) and analyses with them.

From the logical point of view researches are either deductive or inductive.

**Deductive approach:** The deductive approach usually started by analysing the
literature and continues with stating a problem in which the existing knowledge
might be inadequate and then follows by formulating a hypothesis. During the
research process (which can be experimental, observation, survey, case study, etc.) the proposed hypothesis will be tested, if the outcomes turn out to be as the hypothesis predicted the research will be regarded as a support for the hypothesis. Otherwise, it will be considered as challenging the hypothesis and more explanation will be needed. Figure 1 shows schematic of deductive research.

![Figure 1: Deductive research](image1)

**Figure 5.1 Deductive research (Source: Hayes, 2000)**

**Inductive research**: The inductive approach has a less structured methodology and tries not to limit itself to a single question and keep its eyes open for any possible result. Unlike deductive approach it starts with the collecting of the data, and then the researcher tries to interpret data to formulate a theory. In some particular methods such as grounded theory even preliminary literature reviews are not recommended (Glaser, 1978).

![Figure 2: Inductive research](image2)

**Figure 5.2 Deductive research (Source: Hayes, 2000)**
As it can be seen figure 2 the main difference between the two approach is in their use of existing data. The deductive approach builds a hypothesis based on the existing literature and then conducts the data collection and analysis to test its hypothesis, while inductive approach conducts data collection and data analysis to come up with a theory. A deductive research can be considered associated with objectivism and positivism. By constructing its hypothesis based on the existing body of knowledge, it accepts that there is only one objective truth and any scientific research will present the only objective truth.

5.4. Research Data
From a data point of view the research can be either qualitative or quantitative. While quantitative methods are the main tools of the positivist paradigm, other paradigms are more (if not always) dependent on qualitative methods. Qualitative methods are considered as a research tool capable of studying complex situations and producing rich findings whilst accepting the influence of the researcher in shaping the research finding (Sutrisna and Barret, 2007). The researchers’ influence in fact refers to interaction of investigator and object (Guba and Lincoln, 1994).

The dominance of quantitative data in solving scientific problems goes back to ancient Greece, Plato who was under influence of Pythagoreans believed that the reality which scientific thought is seeking must be expressible in mathematic terms (Field, 1956). He believed that the only way to overcome ignorance is with numbers, therefore when established the Academia (in 387 B.C.) he required his students to spend 10 years on mathematics before starting dialectics. It can be claimed that quantitative methods and academia originated from the same point; therefore it will not be strange that scientific methods have been dominated by quantitative methods for a long period.

It was only during the past decades that qualitative techniques have become popular in management studies. It can be associated with paradigm change (as mentioned by Kuhn, 1962) and stories of successful exploitation of the qualitative methods.

However, unlike what may look from the surface, proper use of qualitative methods is not an easy task. Guthrie (2008) refers to qualitative methods as “qualitative
Odyssey” and Miles (1979) calls it an “attractive nuisance” which refers to a legal doctrine that if someone leave an attractive object such as an unlocked car, where children can play with it, he or she will be liable for any injuries they sustain.

Qualitative research has been used to describe the alternative to quantitative research and a series of ex negativo definition has been used to describe it (Flick, 2009 ; Denzin and Lincoln,2003). That was maybe due to long history of quantitative methods in history of science. Quantitative methods are based on the positivist 17th century school of thought which considered mathematic as the scientific tool of investigating the world, and believes that numerical methods are ‘super human language of scientifically describing the world’ (Sutrisna,2008).

Though some simplistic definitions such as “quantitative research deals with quantities and qualitative research deals with qualitative data (i.e. text) have been proposed many years ago. It seems that a comprehensive and generally accepted definition could be made only after understanding the main characteristics of the qualitative research.

Denzin and Lincoln (1994) propose an initial generic definition:

“Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world to a series of representations, including field notes, interviews, conversations…At this level the qualitative research involves and interpretative naturalistic approach to the world. This means that qualitative researcher study things in their naturalistic settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them.”

Qualitative methods generally emerge from anti-positivism or constructivism side of the continuum, and they generally believe that there is no objective reality and the researcher has interaction with the research. Simon (1960) as well as Sutrisna (2008) believes that quantitative methods are inductive by nature, however Beard and Van
Fleet (2003) argue that this is not always true, and if this were always the case, then both sets of word wouldn't be needed.

5.5. Research Perspectives
There are three major research perspectives in management and humanities which are generally referred to as nomothetic, idiographic and hermeneutic.

1. The **nomothetic** approach is concerned with identification of general laws (the name has been derived from the Greek term “nomos”, which means “law”). The main idea in this approach is that discovering law about the organization or group under the study will allow researcher to make prediction about how people are likely to act in a given condition. In this approach statistical methods are widely used to average out differences between particular groups and individual idiosyncrasies are not of importance.

2. The **idiographic** approach is concerned with exploring uniqueness, and what makes the group under the study distinctive. **Idiographic** researches usually concern with fewer cases and look at the in more depth. The tools are usually detailed interviews and selective case studies. Though idiographic researchers do not rule out identification of general principles, they look for them in a different way. The main idea is that deep understanding of small group can lead to better understanding of others.

3. The **hermeneutic** approach. Hermeneutic is concerned with meaning. Meaning occurs in several levels; conscious, unconscious, personal, social, cultural, and socio-political. Hermeneutic researchers investigate into how people interpret their experience.

5.6. The position of this research
After performing the initial literature review it was concluded that prevention of claims in major projects is not a realistic objective. Therefore the research shifted toward reducing claims in the large-scale projects. In order to obtain this goal detailed information of projects and people’s perception of claims and dispute were necessary. On this basis the main dimension of the research are as follows:
This research is more close to the interpretivist end of the continuum. As mentioned before in management in general and in disputes and claims in particular the knowledge is inter-subjective rather than objective as the practitioners are themselves part of the problem. In chapter X the role of people in formation of claims and dispute is discussed in detail.

From the reasoning perspective the research has followed both inductive and deductive approach. The theory section was deductive while data gathering was inductive.

The research perspective is idiographic, as it looks into large scale projects and tries to understand what makes them different from relatively small project in claims and disputes.

Sutrisna (2008) adopts the model introduced by Barrel and Morgan (2000) and suggests a four dimensional frame for research methodology, he proposes that each dimension consists of a continuum between to extreme conditions. The fifth dimension is added by the author based on the literature.

Objectivism..................................................x............Constructivism

Positivism..................................................x............Interpretivism

Deductive........... .........................................x...............Inductive

Qualitative.............................. ...x............Quantitative

Nomothetic .................................................x............Idiographic

Though the right hand side and left hand side characteristics are not always coincide, but generally they are close to each other. The position of this research has been shown with (x) in different dimensions.
5.7. Critical Incident Technique (CIT)
CIT is a relatively new qualitative research method initiated in 1940’s by Flanagan. It began from an aviation psychology research program commissioned to Flanagan during the WWII (Flanagan, 1954). At the time the reports of pilot evaluation in the US Air Force consisted of routine stereotypes and vague cliché’s. Flanagan concluded that those reports are short of facts and tried to shift the focus to factual reports given by qualified observers to define objectively efficient or non-efficient behaviours presented by pilots. He made a short questionnaire which was more based than facts rather than general opinion of the instructor:

“Think of the last time you saw a trainee pilot do? something effective/ineffective. What led up to that situation? Exactly what did the man do? Why was it effective/ineffective?”

And then demanded not and answer on intuitions and opinions but on facts. Then, he interviewed experienced pilots and asked them:

“why the missions had failed/ succeeded? What had made the situation critical? What had they done? was it effective/ineffective?”

The result of his study was identification of a set of competencies needed in a good pilot and the required trainings a trainee needs to acquire those skills. This direct factual approach for data gathering later became known as the critical incident technique.

After the war he developed the technique with his colleagues in the department of psychology of the University of Pittsburgh and applied it in other behavioural studies. By publishing the results of these studies (Flanagan, 1954 and Flanagan et al, 1963) his technique became a standard research tool in the social sciences.

Later Flanagan standardised the method in five steps which is more or less the same even today, namely identification, planning, collecting the data, analyzing the data and interpretation and reporting.

(1) Identification
Flanagan believes that description of function is the first step in identification of aim and objective. He recommends the description to be formulised in simple words or catchword with slogan like character.

(2) Planning

At this stage Flanagan suggests that procedure of observation being set. He believes that 4 dimensions of observation should be set in this stage: (1) types of incidents to be observed; (2) the situation relevance to the general aim; (3) understanding the extent of effect that the incident has on the general aim; (4) deciding on who will make the observation. He believes that by deciding upon these four parameters the objectivity and consistency of the study will be increased and consequently the result will be more reliable.

(3) Collecting the data

There are two approaches for collecting data: having experts supervise the process or having individuals report from memory of the extreme incidents that happened in the past. Though Flanagan prefers the former method he accepts that later as well. He advocates four methods for recalling data about the past incidents: (1) individual interview; (2) group interview; (3) questionnaire and (4) using record forms and logs.

The size of the sample is a quite controversial issue. Though in theory it is generally believed that that the process should continue until saturation is reached (i.e. the point at which addition of new incidents cannot contribute more information to the analysis). In practice some scholars such as Twelker cited by FitzGerald et al. (2007) believes any number of incidents more than 100 in generally acceptable and in some papers CIT has been used by using as low as 40 incidents (see Kaulio, 2008) or 20 incidents (see Stewart, 2011)

(4) Analyzing the data

Many researchers (among others Flanagan, 1954; Okalief, 1974 and Woolsey, 1983) identified analyzing the data as the most important step in the CIT. The aim of this
step is to categorise data in a useful manner and in a way that sacrifice “as little as possible of their comprehensiveness, specificity and validity. “

To do so Flanagan suggests a three stage process: (1) determining the frame of reference based on the nature of the research; (2) Formulating the categories using experience, expert judgement and insight; and (3) deciding on the level of generality or specificity in reporting the data which is usually a function of the practical consideration.

(5) Interpretation and reporting

Flanagan believes that this step should start with reviewing the past four steps to understand what bios has been introduced by them to the study. Consequently limitations credibility of the results and nature of judgments shall be reflected in final report. Trustworthiness of the research is highly related to this final stage of CIT.

After Flanagan work in 1954 the method has been used as an effective qualitative research tool in a various fields such as nursing, medicine, job analysis, education and teaching, marketing, organisational learning, psychology, performance appraisal, leadership (Olshfski,1997), alliances (Kaulio, 2008) and other aspects of management.

Olshfski (1997) identifies two common problems in knowledge gained from management studies: (1) knowledge from empirical research doesn’t always reflect problem solving approach adopted by people involved; and (2) since the captured data, theories, and hypothesises will be analyzed and tested in presupposed conceptual and methodological frameworks; the gained knowledge is inherently limited. She suggests that anti-positivist, subjectivist use of CIT can overcome these limitations.

According to Chell (1998) CIT can be used and in accordance to two main principles:

1. **Multi-site approach:** in which incidents are collected from different sites and generalizations are made across the sample.
2. **Longitudinal approach:** in which data is collected within the same project or organisation in different time spans and the evolution of a process is the focus.

The first approach can increases the generalisability of the research as it enables the researcher to contrast and compare the commonalities in themes across different settings while the second approach is more suitable for unfolding consequences of the events which are assumed to be decisive for the outcome, a combination of these approaches can also be used if required.

Another advantage of CIT is that it can generate both qualitative and quantitative data (in both of above mentioned approaches) which increases the depth of the study. A disadvantage CIT can be its retrospective perspective that requires respondents to recall events. However, since critical events are of interest, usually respondents have no problem in remembering them.

### 5.8. Grounded Theory

Grounded theory methods consist of systematic and flexible guidelines for collecting and analysing qualitative data to construct theories “grounded” in the data themselves. These guidelines are more like general principles rather than restricted rules. Grounded theory starts with data. This data can be obtained through observation, interaction and other selected materials (Atkinson, Coffey and Delamont, 2003).

Grounded theory developed in 1960s by sociologists Barney Glaser and Anselm Strauss over their study on high rate mortality in an American hospital. In 1967 they introduced their methods in their book “The Discovery of Grounded Theory”. They define components of grounded theory as:

1. Simultaneous involvement in data collection and analysis
2. Constructing analytic code and categorizing data
3. Using comparison between different stages of the research
4. Advanced theory collection in each stage of data collection
5. Memo-writing to elaborate categories and define relationships
6. Sampling aimed toward theory construction
7. Conducting the literature review after developing an independent analysis

Charmaz (2009) believes that grounded theory methods are not a prescription or package; they are some flexible guides that can complement other approaches to qualitative data analysis rather than standing in opposition to them.

**Data gathering**
According to Glaser (1978) in data gathering researches try to answer the question “what is happening here?”. Intensive interview is one of the ways to answer this question. An interview is a directed conversation (Lofland and Lofland, 1995) and intensive interview gives the researcher in depth information about on a particular topic or experience. Interviewer usually asks the participant to describe his own experience. For grounded theory purposes the participant does most of the talking so open ended question are more used.

In grounded theory interviews must be both in-depth and flexible; the interviewer should correct his (or her) tendency for following preconceived notions about what is really happening in the field A major difference of grounded theory interviewing with other in-depth intervening is that the range topics is narrowed to gather specific information for developing theoretical framework as the interviews go on (Charmaz, 2009).

**Textual analysis**
Textual analysis is an inseparable part of all qualitative researches. The researcher might have made the text himself or he (or she) might have obtained it from other sources. On this basis the texts can be divided into two groups:

- **Elicited Texts**, which researches have been partially involved in forming them. The data have been usually gathered to answer researcher’s query. A mailed questionnaire or an internet survey which contains open ended questions or a typed interview are examples of elicited texts.
• Extant Texts, which consists of different documents that the researcher has no role in preparation of them. Statistics, organisational reports, archival data, literatures are of main forms of extant texts.

**Coding**

Coding is the process of naming segments of data with a label which simultaneously categorises, summarises an accounts for each piece of data. It is a critical stage between collecting data and development of a theory that explain that data.

According to coding in grounded theory consists of two phases:

1. The initial coding which involves labelling each line or segment of data
2.Focused coding which uses the most significant or frequent initial codes to sort, integrate and organise large amount of data.

During initial coding the researcher remains open to all possible theoretical directions, later he uses focus coding to discover and develop the most important categories in large batches of data. In grounded theory codes immerge as the researcher studies the data, therefore coding may take the research to an unexpected area and change the research question.

Charmaz (2009) raises the issue of language in coding process. She believes that researches cannot be neutral as their language while coding the realities confers form and meaning on the realities. Language reflects values and views. And our codes arise from languages, meanings, and point of views from which we look at the empirical world.

There are different methods for initial coding such as word-by-word coding, Line-by-line coding and coding incident to incident.

**Line by line coding** means tagging every line of the written data (Glaser, 1978), though not every line contains a complete sentence and even not every sentence is important, it is a systematic method that can ensure the researcher that he will not miss any point.
**Focused coding** is the second phase in coding; here the codes are more directed, selective and conceptual than line-by-line coding. Here one tries to synthesize and explain larger segments of data. According to Charmaz focused codes can are developed by comparing data to data, later on data is compared with these codes which help the researcher to refine them.

**Theoretical coding** is a more sophisticated coding which is performed on the codes selected during focused coding. According to Glazer (1978) the man idea in this stage is to conceptualise “how substantive codes are related to each other as hypotheses to be integrated into theory”. In the other word theoretical coding specifies potential relationships between the categories which have been developed during focus coding.

**Memo-writing**

This is an intermediate activity between data collection and writing a paper in this stage certain codes are selected and formed inform of a theory. There is no single mechanical procedure for defining a good memo. Charmaz (2009) suggests researchers to do what is possible the material they have and gives these general guideline:

Lempert (2007) holds “memos are not intended to describe the social worlds of researcher’s data, instead they conceptualise the data in the narrative form.” Flick (2009) points that memo writing can include referring to the literature and diagrams for lining, structuring and contextualising the concept. It may also include quotes from respondents’ interviews or field conversations as further evidence in the analysis.

Hood (2007) compares grounded theory with other inductive method and finds three crucial differences: research in grounded theory consist of theoretical sampling, constant comparing of data with theoretical categories and the focus is on developing of a theory via theoretical saturation of the categories rather than substantive verifiable findings.
According to Sutrisna and Barrett (2007) the results of a grounded theory research should be traceable back to the empirical data and the studied phenomena.

**Critical incident technique and grounded theory**

The relationship between critical incident technique and grounded theory is not well defined. Chell (2006) believes that CIT has been developed in grounded theory frame and refers to work of Curran et al. (1993) to show this relationship.

Charmaz (2009) categorizes incident coding as an initial coding technique. She explains that in this technique incidents are compared with incidents, and as the idea is formed incidents are compared with the formed idea; in this way properties of the emerging concept can be identified.

**5.9. Triangulation**

Flick (2009) defines Triangulation as taking different perspective on the issue under study or research question by the researcher. Denzin (1989) distinguishes four types of triangulation:

1. **Data Triangulation.** This refers to use of different sources of data, and should not be mistaken with using different methods for generating data. Denzin makes distinction between three sub types of data triangulation, and suggests studying phenomena at different dates and places and from different people.

2. **Investigator Triangulation.** In this type of triangulation different observers or interviewers are used to detect and minimize biases insert to the research from the researcher as a person.

3. **Theory Triangulation.** Here the starting point is approaching the data with different sets of theories and hypothesis in mind. Various theoretical points of view could be placed side by side to assess their utility and power.

4. **Methodological Triangulation.** Denzin distinguishes two sub types here: within–method and between methods triangulation. An example of the first sub type is to use different subscales for measuring an item in the
questionnaire, while an example of the second sub type is combining questionnaire survey with a semi structured interview.

According to Denzin (1989) triangulation was first developed for validating the results obtained with an individual method. However over the time its focus has been shifted toward enriching and completing knowledge.

Flick (2009) emphasises that though triangulation can be very helpful in qualitative researches it is not a necessity at all.

5.10. Methodology of This Research
Different research methods have been used in this research to answer the defined research questions.

Three case studies have been performed. The first one is a literature based one on Heathrow terminal five construction. The main idea was studying the characteristics of one of the most successful partnering projects and study if such arrangements can be made in other major projects. The other two case studies are on petrochemical projects in Iran, these studies show the main types of claims, their value, their origin and project managers’ attitude toward them.

Following these case studies a series of cases which refereed to a central mediation office is reviewed and categorised to show the frequency of different types of claims in EPC- turnkey and EP+C projects.

A series of interviews using critical incident technique is also performed to obtain project managers’ perception of main causes of claim and measures to reduce them in the major oil and gas projects.

To verify the outcomes of the interview a web based questionnaire survey is conducted.

In the following sections fundamental theories behind the methods which are used are explained.
Figure 1.1 in the introduction chapter shows how different research methods are used throughout the research to answer the research questions and fulfil the research aim.

5.10.1. Case Studies

It was clear from the early stages of the research that a quantitative method will not suit the research questions. As it is discussed in the literature, any research question consists of two parts: substance and form. Substance is about the subject of study and form is about the type of question the researcher tries to answer. When the question is explanatory (i.e. ‘how’ and ‘why’ questions) usually the use of quantitative method is more recommended (among others Ghauri and Kjell, 2010).

There was an ontological problem with the research question as there was no available data on projects which experienced no dispute and claim. Many attempts have been made to obtain information from major projects in made but they were not successful. Some of the organisations which have been contacted were The Olympic Development Authority (ODA), The World Bank, Major Projects Association (MPA), and various International oil companies. Eventually the research started by looking into the only available dispute-free project, the famous Heathrow Terminal Five (T5). There were loads of secondary data available on that project in forms of books, papers and news paper articles. Afterwards another research front has been opened and two cases from Iranian petrochemical industry have been studied, however both projects have experienced long and costly disputes.

According to Yin (2003) case studies can be very useful for covering contextual conditions which are believed that may have effect on the subject of the study. Although surveys can also deal with the phenomenon and context, its ability for investigation the context is extremely limited, this limitations is mainly due to survey designer’s will to limit the number of variables (and consequently number of questions) to increase the rate of respond. Gronhaug and Ghauri (2005) also suggest that when parameters which can affect in an event are not clearly known case study can be method of choice.
According to the literature the main problem with case studies is that they cannot be extrapolated to all cases. In order to overcome this deficiency other sources of qualitative data was required.

5.10.2. Questionnaire survey

Two questionnaire surveys have been conducted in this research. The first questionnaire has been mainly used to get access to lawyers for detail interviews. It was made based on literature review and consists of three sections:

The first section was trying to get some information about the people and type of project they are involved in.

The second section was about main causes of delay in the respondents’ are of activity.

The third part contained questions about people’s idea about claim avoidance in construction projects and different factors that can play role in it.

And finally the last part which was a section for information of people who are willing to help the research by offering an interview or case study the idea was getting access to some detailed information that can be used in quantitative analysis from some of the people the questionnaire has been sent to them (a passage from quantity to quality as dialecticians said say!)

A pilot survey has been conducted using 8 respondents, and the questionnaire has been modified based on the feedbacks.

In order to communicate with more people a web page has been designed which explains the outline of the research and resume of the people involved in the research [Accessible at: http://www.mace.manchester.ac.uk/research/groups/manufacturing/projects/claim_avoidance/]

The questionnaire has also been uploaded on the university website [http://survey.eps.manchester.ac.uk/TakeSurvey.aspx?PageNumber=1&SurveyID=2KK452] and linked to the research web site.
Literatures such as Slevin (1997), Wyatt (2000), Truel (2003) and Kaplowitz et al (2004) show that main advantages of web based surveys over mail and fax based surveys for the samples who are “technologically savvy” are low cost, speed of delivery, ease of data cleaning and data analysis, design flexibility, geographical reach, anonymity and minimized questionnaire error. However as Sills and Song (2002) explains low response rate, lack of generalisability, non-random sampling, and problems with junk emails are some of the concerns with using web based survey for general public.

Members of Society of Construction Lawyers (SCL) and Royal Institution of Quantity Surveyors (RICS) have been selected as target group. 250 construction lawyers and 80 surveyors have been requested via email to participate in the study. Despite sending two reminder letters the respond rate was lower than expectation and about 12%. And only 10 people agreed to participate in an interview.

The second survey has been conducted among clients and contractors of major Iranian projects to verify the findings of interviews. Again the survey was online and the questionnaire is available at this address: http://survey.eps.manchester.ac.uk/TakeSurvey.aspx?PageNumber=1&SurveyID=m8LKl88&Preview=true

The rate of response was again lower than what was expected. 150 people have been invited via email to participate in the survey and after two reminders only 25 people completed the questionnaire.

5.10.3. Interviews
The interviews were consisted of two parts. In the first part Critical Incident Technique was used and the interviewees were asked to speak about the most contentious as well as the smoothest (i.e. dispute free) project which they have experienced. The second part was semi structured interview around the dispute avoidance measures. Critical incident technique is explained later in this chapter.
7 interviews performed in the UK but unfortunately the areas of works of interviewees were so diverse that the data could hardly be of any use for answering the research question.

In order to deal with this problem, a series of interviews have been performed among some key actors in the industry such as CEO of major construction companies, project managers in contractor companies, ex-project managers in the Iranian Ministry of Oil and a couple of legal advisors. Profiles of the interviewees are presented a. The structure of interviews was similar to those performed in the UK. Profiles of the interviewees are presented as an appendix.

The interviews analysed using a grounded theory approach. To do so first the transcribed coded line by line, then in a secondary coding similar codes were put together, later on small memos prepared based on these secondary coding. Finally the memos developed using literature and direct quotes into texts which define the problems people faced in projects from their point of view.

This grounded theory analysis gave a vivid picture of “how things are done” in relation with claims and disputes the Iranian oil and gas projects. In the course of the research some documents and reports have been obtained that helped to enrich the collected data. The concept of grounded theory is explained in the following section.

As mentioned before following the interviews another web-based questionnaire survey has been performed to triangulate and verify the findings of the interviews.

5.11. Summary
Disputes are also very subjective matters, therefore after explaining all available research paradigms this research adopted a post positivist paradigm. As mentioned in chapters two and four quantitative researches are not suitable for research into disputes and claims. Therefore mixed method has been used for obtaining the data. The main focus was on case studies and interviews and later questionnaire survey has been used for triangulation and verification.

The grounded theory like approach has been used to obtain a realistic picture of practitioners’ perception of disputes and claim in the industry.
Two parallel lines of data gathering have been followed in this research, one in Iran and the other in the UK. However the data gathered in the UK was too scattered to be analysed and lead to any conclusion.
CHAPTER SIX – HEATHROW TERMINAL FIVE CASE STUDY

6.1. Introduction

Heathrow Terminal Five (T5) project is known as one the most successful mega projects in the recent years. Despite the unique design, construction restrictions and scale of works the project has been completed almost within the budget and on time. Many scholars associated project success to its innovative procurement strategy, known as T5 Agreement, which is a form of partnering arrangement between the client and main contractors.

Since its completion, T5 became the exhibit of partnering success in construction. This chapter looks at this project in more detail and investigates if the same procurement strategy and agreement can be used in other large scale projects.

Many papers and even books have been published on Heathrow Terminal 5 (T5); some of them are published by project stake holders which are more or less self admiring works (for example see Doherty, 2008 and Wolstenholmes et al., 2008) and some are looking at the project from specific perspective for instance Archer and Cameron (2008) are focusing on leadership in the project or Pryke (2009) looks at material procurement and supply chain management in T5.

Regardless of their area of interest almost all of the authors refer to smooth and non-adversarial attitude of the stock holders in execution of the T5 project. Using the considerable body of literature on Heathrow T5 project, this case study tries to identify key features of the project that causes such a huge project be completed on time, on budget and with no major litigation, and investigate their applicability in other projects.
6.2. Background

It might not be much of coincidence to see that Sir John Egan in the board of directors of BAA while the biggest collaborative project in the history of construction was in progress.

6.3. History of the Project

There might be some controversies on definition of mega-project, but there is no doubt that T5 was a megaproject in any scale. At its time (2002) it was the largest and most complex project in the Europe, costing £ 4.3 billion (Flyvbjerg, 2003). Its main terminal building alone costs £1.4 billion and is the largest single span structure in the UK at 396m long by 158m wide.

Despite problems in starting operation, completed on time and to budget, T5 is considered one of the most successful projects in the history of UK construction industry.

6.3.1. About BAA (the client)
T5 is operated by Heathrow Airport limited, which is a subsidiary of The British Airports Authority (BAA plc). BAA is the world’ largest airport operator who operates Heathrow complex as well as Aberdeen, Edinburgh, Gatwick, Stansted, Bristol, Southampton and Glasgow Airports in the UK. It also has interests in some airports in the USA, Italy, Hungry and Australia. Established in the early 60’s and privatised in 1986, BAA floated in the London market exchange with capitalization of £1.225
billion in 1987, in June 2006 BAA was bought by a consortium led by Ferrovial, an
Spanish construction company, and in August 2006 was officially delisted from the
London Stock Exchange.

BAA is not only an airport operator but also performed design and construction and
project management of different airports and infrastructure projects such as
Heathrow Express High speed Rail Link and Genesis Project (a parking, accommodation and office project for the World Cargocenter).

6.3.2. About the project
The BAA Heathrow Terminal 5 (T5) approved by the secretary of the state in
November 2001 after a 46 month inquiry and completed in March 2008. By
completion it increased the capacity of Heathrow Airport by 50%. T5 can be typical example of a multi disciplinary construction program; it includes a vast new terminal and satellite buildings, nine new tunnels, two river diversions, and a spur road connection to M25. During the pick of the program the monthly spend exceeded £80 million and 8000 workers were on site (Potts, 2008). The program divided to 18 main projects, 140 subprojects and 1500 work packages on a 260 ha site.

The key stages of the phase I can be broken to these stages:

- Site preparation and enabling roads (Jul 2002-Jul 2003)
- Ground works (Nov 2002-Feb 2005)
- Super structure (Nov 2003- Feb 2006)
- Fit out (Feb 2005-Sep 2007)

The cost of the program was budgeted £3.1 billion at 2002 price, with 20% of total cost contingency budget (£600 million) to cover increases in payment, risks of planning, design and construction failure, changes, theft and fraud. (Competition Committee, 2004)
6.3.3. Risks of the Projects

Any project in this scale is prone to major risks in the case of T5 performing the construction in one of the busiest commercial airports in the world imposed even more risks. Low (2009) lists some of the constraints attributed to T5 construction as:

- Undertaking the UK’s largest ever archaeological excavation
- Divert the duke of Northumberland and the Longford
- Requirement to extend the Heathrow Express
- Imposition of restrict traffic restriction around the site
- Noise prevention
- Avoidance of electromagnetic interference
- Preventing disruption of the existing terminal activities
- Consideration of an operating airport security requirements

Potts (2008) also refers to aim of the BAA to build the top of the line airport and use the most advanced technology in the design which didn’t let them to freeze the drawings before the start of the construction.

6.4. Project Management Philosophy

A traditional approach for tackling these problems can be outsourcing the works and transferring all attributed risks to subcontractors, but that was exactly what the BAA tried to avoid. Unlike most of the mega-project promoters BAA decided to run the project itself reasoning that outsourcing will be cost more.

The history of major construction projects in the UK shows that if BAA had followed the traditional rout, the project would have completed three years late, 8% over budget and with six fatalities (Riley cited by Whitelaw; 2004). BAA simply couldn’t afford it. They developed a project management approach based on the principles specified in Constructing the Team (Latham, 1994) and Rethinking Construction (Egan, 1998) but it went further than any other collaborative project (Potts, 2008).

Commercial manager of the project expresses:
“... if we fail the impact on our reputation and our relation with stakeholders and the city would not worth contemplating. We had to accept that BAA had to accept all risk for T5. It was something we could not pass on. The benefit is that by accepting that you have all the risk, you take away the negativity, allow space for innovation and create the opportunity for people to perform at levels they have not been allowed to before, you ask people to lose their company allegiances, and instead think of the project as their first love.” (As quoted by Whitelaw, 2004)

In the other word based on the this approach client accepts legal responsibility of the project’s risks and in return all suppliers working on the project should work as a single virtual company they are also required to share their information, knowledge and expertise with colleagues in other professions. Under such approach all team members will be equal, and problem solving and innovation were encouraged. These measures spare unnecessary costs such as costs of claims and litigations and increase the productivity level (Douglas, 2005).

This strategy has been applied by using “T5 Agreement”. Actually it was a relational contract between BAA and 60 first tier contractors and suppliers including architectures, engineering design consultants, general and special contractors and manufacturers (Fullalove, 2004). The BAA legal and commercial teams designed the contracts aiming to minimize the claims and litigations which is known as an intrinsic part of the major projects. Unlike other agreements which discuss in detail what remedies shall be paid in case that things go wrong, T5 agreement aims positive problem solving behaviour to avoid things go wrong in the first place.

Potts (2008) lists some of the characteristics of T5 project management philosophy as:

• Agreement with suppliers didn’t specify the work required, instead it contains commitment from the partner, statement of capability, capacity and scope of work.
• The organisation was based on delivery of final product (i.e. operational facilities) not just buildings.
• BAA acquired the best people to suit the job including 160 experienced people from other organizations.
• Key information such as time tables, risk records and work scopes were freely available to all members in the integrated management team.
• A team of 30 change managers provided training and support for implementing cultural change required to work in an open and collaborative way.

The first tier suppliers were responsible for appointment and management of the second tier suppliers, and relations between second tier suppliers and other suppliers down the supply chain were regulated by various contracts which BAA expected them to be in agreement with “T5 Agreement”. It is also mentioned that BAA suggested NEC contracts to be used by the second tier suppliers (Fullalove, 2004). Figure 6.1 shows the relations along the supply chain.

![Diagram](image)

**Figure 6.1 Contractual relationships in T5 (Source Ernst & Young, 2005)**
The T5 project management team reviewed some of the high profile projects which have been performed in the past few years such as Millennium Dome, Jubilee line Extension, British Library and the Scottish Parliament and reached to the conclusion that no matter how the risks are allocated in a major project, it is always the client who bears and eventually pays for the risk. Therefore BAA decided to retain all risks of the project. The unique attitude of project toward risk is often known as one of the success factors of the project (Davies et al. 2006).

Mathew Riley supply chain manager of the project describes the risk of project as follows:

“If we were applying the average outrun performance of those projects to T5, a five-year program would probably be two years late, a cost target of £4.3 billion probably be at least £1 to £1.5 billion over budget and the quality would be variable .... We are about to embark on investment that is going to add almost 50 percent to the assets base of the company, yet if we applied some of those outrun performance metrics to T5, at best it would potentially run the risk of destabilising BAA financially. At worst it could put us out of business.” (As quoted by Brass, 2008)
"We realised you cannot transfer corporate risks around that are so intrinsic to the success of your company; risks that relate to the City or to airlines or regulators or to your corporate citizenship...Those risks can't be transferred down a contract. You're kidding yourself if you think they can, because, in each of those examples we looked at, there were very few suppliers that went out of business as a consequence of those project failures. The risk ultimately comes back to the client organisation." (As quoted by Brass, 2008)

Similarly Sir John Egan expressed:

“‘We felt that T5 was a very dangerous project because it was so big that is was very close to the net worth of the company.’” (Quoted by the Financial Times, May 8 2004)

Riley describes BAA strategy regarding risk as:

"We were holding the commercial risk, and as a consequence our suppliers had no reason to hide, and we were able to demand complete transparency of plans where we felt it was appropriate to do so. We wanted all the best brains focused on good technical solutions, trying to actively look at managing the cause of potential risks - rather than all the best brains focused on protecting commercial positions and managing the consequences of failure after the event. That's a big shift in mindset and approach." (As quoted by Brass, 2008)

The mindset of T5 agreement was moving away from traditional construction contracts in major projects in which client generally choose the contractor who bids lowest and always has this mentality that the contractor is going to use potential design errors and variations to act opportunistically and increase the tight profit margins set in the bidding stage.

This mentality often causes disagreement between the client and contractors (and suppliers) over legitimacy of the claims during the course of the project execution that can lead to costly and time consuming litigations and even end to delay and
disruption. Contrary, T5 agreement tried to encourage contractors and suppliers to move to the best practice, exceptional performance and actively seek for affordable solution. Fiona Hammond former construction lawyer at BAA expresses:

“One of the ways to manage our risks is through integrated supply chain. You cannot have truly integrated supply team unless they are working under the same baseline. It is farcical to think that you have an integrated team if they have different commercial expectations, objectives and base lines.”

The agreement clearly mentioned that the delivery targets are deliberately aggressive and BAA is intended to set a work environment “where costumes and normal practices are not accepted as a given, where all continually challenge how we can be successful.”

It required suppliers to change their work practice:

“Thinking of others as well as oneself so that we (BAA and suppliers) all win together is a must. Being able to see the wider benefits will entail a change of mindset, possibly changing out people; there will be no room for those who are not committed, who want to spend all their time saying “why it cannot be done”; it will require the enthusiasm and energy of those who are prepared to work ‘how it can be done’. No, this contract doesn’t contain much of conventional type of language, the ‘legalese’, yes – it does try to send out in language more familiar to those in workplace how together we might be able to make it work – to deliver success. We don’t apology for this.” (Extracted from T5 Agreement)

It also required “exceptional performance” from the suppliers and added:

“... our minimum requirements are in practice governed by a set of achievable targets. We have benchmarked the best of UK construction in establishing achievable target. We have consequently called this level of performance “best practice”. This is the minimum level of performance that we requires everyone on the project to commit to. While this is a step
up from the normal level of performance required, ‘business as usual’, it should not be a problem. We have procured companies and people on the basis that you are expert in you field; you are leaders in your industry; you are making people and skills available committed to this expected level of performance.” (Extracted from T5 Agreement)

![Figure 6.3 Comparing exceptional practice with usual practice and best practice](image)

In words of the BAA directors (see Wolstenholme et al, 2008)

T5 agreement has been built around three simple success thymes:

- Do what you are doing well and do it better
- Understand ‘how’ you will deliver, as well as ‘what’ you need to do- this means addressing organisational; developments as well as technical skills.
- Continually work on relationships including both inward facing (inside the project) and outward facing activities.

They believe that main characteristics of T5 agreement are:
**Integrated project team**

T5 delivery strategy was based on the concept that project being composed by a series of product which will be delivered by fully integrated teams, by using completely integrated supply chain in which BAA played the leader role. Unlike conventional team ups, in T5 teams were not built by disciplines, or companies, but were assembled around ‘costumer product’. The main idea was that team members have the required set of skills irrespective of who employs them. The teams were like virtual organisations consisting of BAA, engineering companies and contractor’s employees.

**All risks on client**

It is well known that in T5 project BAA has accepted all the risks, all the time. To understand this concept and its role for underpinning the commercial principles of the project it is important to distinguish between ‘risks’ and ‘liabilities’. In this context risk is the potential for harm or opportunity while liability means who will pay when things go wrong.

By making this distinctions BAA understood that she can transfer the liabilities to other parties when a risk materialises (through contractual arrangement for receiving compensation), but will not be able to transfer risk, be cause she will always be the party who suffer from the harm and receiving the compensation money from a third party is unlikely to can recover the harm. More over some harm cannot be quantified at least for the purpose of arranging contractual liabilities.

They believed that one of the underpinning concepts of the T5 Agreement is the fact that risk is one of the facts of the life and no contract can change this fact. The main risk of the project was failure of BAA to meet the targets, and transferring this risk down to the supply chain was not meaningful. Therefore BAA decided not to do so unless for a very small portion which was used as a measure to ensure the compatibility in supply chain.

Another issue which should be noted is that the teams were fully integrated and composed of employers of BAA and different suppliers; under such circumstance the
notion of transferring risk to any of suppliers is nonsensical. Likewise expecting any supplier to price the risk is meaningless.

Shared liabilities

In T5 agreement liabilities were shares between BAA and suppliers on no-fault basis. The supplier part (with some exceptions) was capped by the amount of available incentive fund. Since that amount could not cover the consequences of project risks, BAA also took out employer-controlled insurance to cover the whole supply chain. The insurance were covered all project risks and third party liabilities, the insurance was also on no-fault basis wherever possible.

Cultural commitment

In an innovative way T5 Agreement also addresses organisation and cultural aspects which are required for achieving project’s targets. Though these issues can hardly be put in a contract they were important enough for BAA to explicitly require suppliers to be aware of and focus on partnering trust and cooperation both in individual and organizational level, and being seen to do what they say.

This formed the basis of the central contract used to govern supply relationships for the terminal, the T5 agreement, which departed substantially from standard contracts in the sector. Riley says: "The T5 agreement took technical competence largely for granted, and focused as much on the behavioural competence of both companies and people, which again was a unique feature."

Procurement

About 75% of T5 value (i.e. £4.3 billion) was contracted under T5 Agreement between BAA and 80 first tier companies. The rest of project value was associated with special services or liabilities and special contracts appropriate for the parties involved were used. For instance Thymes water, Highway agency, London underground, network Rail and Heathrow Airport Ltd.
BAA also recommended a BAA version of NEC contracts to be used by first tire suppliers for contracting with thousands of second tire suppliers. They also used various forms of NEC (specially the professional service contract) for direct contracting with about 150 consultants and other suppliers. (see Figure 6.1)

6.5. Completion

On 1 September 2005 official “topping out” ceremony was held, and the terminal officially opened on 14 March 2008. During the opening ceremony BAA director stated:

“From every perspective, this is a landmark project and I’m proud to think that T5 has become a model construction project, setting new higher standards for an industry around the world” (as quoted by Lowe, 2008)

Unlike what is widely believed the project experienced some difficulties for example in October 2007 BAA acknowledged that M&E installation were exceeding its target cost by £56,000 an hour, and similarly another £90 million has been injected to the project for additional fit-out costs. However considering the scale of work and comparing to similar projects in the past T5 was definitely considered a successful project, at least in construction.

The operation of T5 started on 27 March 2008, and unfortunately a major problem in baggage handling system caused 200 flights being cancelled, hundreds of flights delayed and thousands of luggage items being mislaid. Ultimately transfer of long route flights which was supposed to took place in March postponed to October. It is believed that these problems cost BA more than £16 million, the house of common set up a committee to investigate the issue, and BA director of customer service along with Heathrow Airport’s executive director forced to resign. Moreover Northwest Airlines and BA announced that have reserved the right to take legal action against BAA for the problem caused by delay and faulty operation (Taylor, 2008 and Gray, 2008).
6.6. Comments and Future Perspective

Despite successful experience of T5 (in construction phase) and suggestions that T5 agreement can be used in other infrastructure projects such as nuclear facilities (for example see Millet, 2008); it seems that BAA is not so interested to repeat the same form of experience the future works. As Lowe (2008) and Grant (2008) quote BAA will not use T5 agreement/ procurement for construction of second satellite building known as T5c. Instead they appointed Carillion as ‘Complex building integrator’ to deliver the project.

As mentioned before in 2006 Ferrovial, the Spanish construction group, took over BAA at a price between £10.1 and £10.3 billion, which was 50% above the market value. For financing the deal Ferrovial borrowed approximately £9.2 billion. Since CAA made it clear that it wouldn’t approve any increase in landing charges, BAA tried to reduce overhead charges and outsource “non-core” activities to cope with the debt. These events followed by resignation of some of the top managers in BAA, could indicate that the organization’s culture is changing. Former director of BAA showed reaction to the change of the events and stated:

“BAA should be asking itself what kind of company it is. Is this a company that is investing in the future infrastructure of Britain, or is it the company that scarifying its key concerns because of its debt structure?” (Quoted by Stewart, 2008)

The media also concluded that BAA will put T5 innovative procurement method aside under the new ownership and the reformist client is giving up his role in changing the construction industry. Finally Andrew Wolsteholme, director of capital projects in BAA, answered to these concerns and expressed that:

“what we are doing with the next generation of the frame works it is picking up the learnings from the T5 and acknowledging that one cap does not feet all our projects ... the projects will run very much in T5 style, and we will handle risk in appropriately different ways... perhaps BAA got too involved in some areas of integration where
we should have stood back and let our first tier suppliers take on more of that accountability. There are a lot of different ways to get the same result.”

6.7. Looking At T5 Agreement from Transaction Cost Perspective

6.7.1. Hierarchical structure instead of Market

Transaction cost economics is discussed in detail in chapter 3. In short, transaction cost (TC) is the cost of measuring the valuable attributes of what is being exchanged and the cost of protecting rights and policing and protecting agreements (Arrow, 1974). Transaction cost economics maintain that in some case TC can be so high that formation of hierarchical organization instead of market relation can be more efficient (Williamson, 1979).

Williamson and other TCE scholars assert that frequency of transaction between the parties and asset specificity are the two dimensions based on them the optimum form of relation between the parties can be selected. (For instance see Eriksson 2006 & 2008 and Winch, 2010). (See Figure 3.6)

The reviewed literature show that T5 had one of the highest risks among construction projects, beside execution limitation and unique design the value of the project exceeded two third of the client’s assets. In fact, it will be hard to imagine a case with higher asset specificity than this case.

BAA started using framework agreements in 1993, and became partner with some the preferred suppliers. The first agreement was 5 years contract for a wide range of services including design and engineering consultancy, construction and special services (Potts, 2009). In 2002 BAA developed the second generation framework agreement, to implement best practices and work for longer period. The duration of agreement was 10 years, and demonstration of hard evidence for continues development was one the critical requirements of it (Brady, et al, 2006). So it can be seen the factor of frequency is also existed between the BAA and first tier suppliers.
Considering Williamson theory, by existence of both risk and frequency factor it will not be strange to see that BAA preferred to manage the project itself rather than outsourcing it.

6.7.2. Relational and Partnering Approach instead of a Contractual one

In construction industry procurement system is defined as organisational structure adopted by client for management, design and construction of project (Masterman, 2002). Palay (1984) describes governance structure as ‘an institutional framework in which contracts are initiated negotiated, monitored reinforced and concluded’. Therefore it seems that we can use procurement system and governance structure interchangeably in the context of construction industry.

Again TCE maintains that each transaction based on frequency and asset specificity has an efficient governance structure which can reduce the TC.

As mentioned before high asset specificity and high frequency of transactions between BAA and the suppliers put T5 in the right hand side of the table and, the governance structure of choice would be trust. This was exactly what BAA chose, when moved from contractual to relational engagement as developed T5 Agreement as the corner stone of the project.

And again when BAA emphasized that T5 Agreement does not suit all projects, it is in accordance with TCE which maintains that using a hierarchical governance structure is justifiable only when TC is high enough, otherwise market structure (outsourcing) will be more economic.

6.8. Summary

T5 project has not experienced any serious dispute and litigation. This is a great achievement for a project in this scale. However, this fact must be associated with the particular attitude of the client towards project risk. The client literally accepts all
the project risks, therefore there is hardly any reason for dispute. Such strategy increases the cost of project to a great extent.

Due to lethal risk of project failure for the client and history of previous work between the client and tier one contractors this arrangement was suitable for this particular project, but it cannot be recommended for all large scale project. BAA’s decision for not use this type of procurement in its upcoming projects (As quoted by Low, 2008 and Grant, 2008) can prove this idea.
CHAPTER SEVEN – THE ROLE OF CULTURE

7.1. Introduction
The case studies along with a questionnaire survey and detailed interviews show that disputes and claims between clients and contractors are a major problem in Iranian oil, gas and petrochemical projects. The case studies give a picture of the extent of these disputes. However the rate of litigations is surprisingly low.

The question which arises is if this nonconformity is due to cultural characteristics of the Iranian society or in a more general sense, if national culture can affect disputes and claims in any other way.

As Kluckholn (1951) says ‘culture is the values, behaviours and attitudes which distinguish people of one society from another’. Since all the data has been collected from Iran, it seems logical to take a look at the national culture and its potential effect on the behaviour of project stakeholders. The author does not wish to relate project events exclusively to cultural dimensions, but believes that the pivotal role of culture must be considered along with commercial and legal aspects of the projects.

This section continues with the definition of culture, and then explains principles of two of the most credited studies in national culture (i.e. Hofstede and Trompenaars). Subsequently, the main aspects of the Iranian business culture are discussed using a literature review and finally these aspects are used to explain the findings of this research.

7.2. Definition of culture
According to McKenna (2006), in the social sciences culture is studied when researchers try to understand shared meanings and values among members of a society that give significance to their behaviour.
There are many definitions for culture in management literature. For instance Handy (1999) defines culture as “the material and spiritual heritage of a community, the stock of myth and stories, tools, laws, institutions, rituals and costumes”. Meanwhile Schein (1992) defines culture as “the cement that holds the society together by established shared meaning and values, which enable members of the community to communicate with each other; taking many things for granted, basic assumptions”. Goeffee (1997) defines culture as “a historically created guide for living... which are derived from assumptions that are not directly accessible but may be reflected in the values, attitudes and behaviours of individuals and groups”. He believes that these assumptions have been learned over the generations and are passed down through the generations. Trompenaars (1997) defines culture as the way a group of people solves their problems and reconciles dilemmas. Swindler (1986) also adopts the problem solving concept and defines culture as a toolkit of symbols, values, rituals and world views that help people of a certain culture survive and succeed.

Many scholars (among others Handy, 1985 and McKenna, 2006) believe that culture can be studied at different levels for instance at organisational, industrial and national levels. Spiess (2008) refers to differences in business and project management cultures between continents, regions and countries and maintains that the degrees of formality in relationships, method of work and dispute resolution, attitude towards risk and communication style are all reflections of differences between cultures in different countries. He admits that with increasing globalisation these cultural differences diminish but argues that they are still too influential to be ignored.

From a conflict management point of view, people’s perception of conflict and their attitude towards dispute resolution is highly affected by their national and organisational culture. Turner (2009) maintains that cultural difference by itself can even be the main cause of conflict in international projects.

7.3. National culture
Many Studies have been performed on the nature and extent of cultural differences among different nations. The most comprehensive study has been performed by Hofstede (2001). He identified four criteria for national culture, which can be used as independent and bipolar dimensions for mapping national culture.

1. **Power Distance**: This dimension evaluates the extent to which superiors are encouraged to use power. In a society with high power distance, the power imbalance between the superior and subordinates is accepted and usually there is a low level of trust between the two. The decision making process is centralised and subordinates do not participate in it. While in a low power distance society superiors and subordinates have more friendly relationships, the level of trust is higher and subordinates are expected to participate in decision making. In general the organisation’s structure is flatter.

2. **Individualism**: This dimension evaluates the extent of individualistic features of the culture. An individualistic culture puts emphasis on achievements and personal initiatives and has more concern about self and family. Whereas in a collectivist culture an individual receives help and support from the extended family, tribe or group and in return is expected to remain loyal to them. In collectivist societies emphasis is on belonging to a group, having a sense of duty, and relying on group decision making.

3. **Uncertainty Avoidance**: This dimension defines the extent to which people feel uncomfortable about situations which they consider to be unstructured, unpredictable or unclear, and the extent to which they try to avoid such situations usually by using strict codes of conduct and belief in absolute truth.

4. **Masculinity versus Femininity**: In masculine societies emphasis is placed on money, material position and ambition with clear lines between males and females. Challenge and advancement is encouraged and people make decisions individually. On the contrary, in feminine societies emphasis is on cooperation, friendship, job security, environment, quality of life and there is no clear distinction between the sexes. Group decision making is more
popular, and managers delegate responsibilities to subordinates more frequently.

Later, in 1988, Hofstede added the fifth dimension to his model, time orientation. It deals with personal thrift, perseverance, and adoption of traditions to the modern world. This dimension is found in the teachings of the Chinese philosopher Confucius. However, the dimension also applies to countries without a Confucian background (Hofstede and Bond, 1988).

Trompenaars (1993) argues that people organise themselves in such a way to increase the effectiveness of their problem-solving processes, and so have formed different sets of implicit logical assumptions to enable this to happen. Each culture distinguishes itself from others by its particular solutions to these problems. In a study similar to Hofstede’s work he distinguishes seven dimensions of culture which are:

1. **Universalism vs. Particularism**

   Universalism means that what is good can be discovered defined and applied everywhere. Particularism means that unique circumstances are more important in defining what is right and good than abstract rules.

2. **Individualism vs. collectivism**

   Individualism maintains that individuals achieve things on their own and accept personal responsibility, whereas collectivism sets individual functions through groups and assumes joint responsibility for the outcomes.

3. **Neutral vs. affective**

   Neutral means that emotion should be kept in check. Neutral cultures consider expression of anger or delight at work unprofessional. They find it quite embarrassing to show emotions in public. Affective means that it is natural to openly show emotions. People with an affective culture show
their emotions immediately either verbally or via body language and they are usually at ease with physical contact.

4. **Specific relationship vs. diffuse relationship**

Specific relations mean that people prefer to keep their public and private lives separate, and protect their privacy. People usually display a public face which can vary to fit the circumstances. In diffuse relationships private faces are more dominant. Work and private lives are closely linked; and the inner-self of people is more exposed.

5. **Achievement vs. Ascription**

Achievement means that respect and social status is given to people based on their earned accomplishments. Ascription respects people for their inherited status, or qualifications but this is quite independent of tasks or functions.

6. **Attitude toward time**

Past oriented cultures tend to focus on the past event and glorify them, while future oriented cultures focus more on planning and studying future possibilities.

7. **Attitude towards the environment**

Inner-directed cultures believe that they are controlling the environment, whereas in outer-directed cultures people focus on living in harmony with the environment.

7.4. **Iranian National Culture**

Hofstede (2001) classifies Iran’s cultural dimensions in the Near Eastern cluster with Turkey and Greece; in a newer study Javidan and Dastmalchian (2003) puts Iran in the South Asian cluster together with India, Malaysia and Taiwan. Ali and Amirshahi (2002) maintain that despite all commonalities with neighbouring Muslim countries
due to its unique historical, racial and linguistic identity, Iran represents a unique culture. Some of the main features of the Iranian culture which have been discussed in the literature are as follows:

7.4.1. Collectivism
Studies by Hofstede (2001) and Yeganeh and Su (2007) show that Iranians are characterised by a high degree of collectivism. Yeganeh and Su (2007) associate this phenomenon with the fact that in difficult circumstances, like a harsh environment and under resource scarcity, survival may depend on group effort and interdependency. While in a more favourable environment people can survive and overcome natural forces individually. The collectivistic orientation of Iranian culture can also be related to the importance of the family, which is the primary building block of Iranian society. In Iranian culture family is not limited to a wife, children and siblings; it may extend to friends and acquaintances and include very complicated networks.

This collectivism can also be seen in Iranian business culture. Schramm-Nielssen and Faradonbeh (2002) claim that personal connections and informal channels are considered more practical than formal ineffective channels in Iran. Yeganeh (2007) also observes that Iranian society tends to operate on interpersonal human based relations rather than dehumanised institutions. Informal channels are also occasionally used in bending rules and obtaining privileges that are not legally entitled.

7.4.2. Masculinity/Femininity
Hofstede (2001) describes Iranian society as a relatively feminine culture. However Fard et al. (2007) contradict his idea. Other scholars have reported some masculine qualities among Iranians such as individual achievement (Javidan and Dastmalchian, 2003) and being militant, hard working and efficient (Daniel, 2001). As Hampden-Turner and Trompenaars (1993) suggest, cultural categories are complicated notions which do not necessarily exclude each other and may coexist.
7.4.3. Power distance
Hofstede’s study also shows a relatively high power gap in Iranian society. Yeganeh (2007) as well as Schramm-Nielsen and Faradonbeh support Hofstede’s findings. Yeganeh (2007) identifies ‘top-down authority like Arab countries but in a more moderate shape from a Western point of view.’

In such conditions most decisions are pushed upward and taken care of by top management. As shown in table 6.1, in Hofstede’s power index, Iran scores higher than most of the European countries while it ranks considerably lower than Arab countries.

By a combination of ‘authority’ and an attitude towards developing ‘interpersonal relations’ it is not strange to see that the most complicated problems will be resolved in a so-called ‘management meeting’ in the absence of middle managers on a tit-for-tat basis.

Table 7.1 shows a comparison between Iran and UK cultural dimensions based on Hofstede (2001)

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<thead>
<tr>
<th>Cultural Dimension</th>
<th>US</th>
<th>UK</th>
<th>Iran</th>
<th>Arab Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Power Distance</td>
<td>40 (38)</td>
<td>35 (42)</td>
<td>58 (19)</td>
<td>80 (7)</td>
</tr>
<tr>
<td>2  Uncertainty Avoidance</td>
<td>46 (43)</td>
<td>35 (47)</td>
<td>59 (31)</td>
<td>68 (27)</td>
</tr>
<tr>
<td>3  Individualism/Collectivism</td>
<td>91 (1)</td>
<td>89 (3)</td>
<td>41 (24)</td>
<td>38 (26)</td>
</tr>
<tr>
<td>4  Masculinity/Femininity</td>
<td>62 (18)</td>
<td>66 (9)</td>
<td>43 (35)</td>
<td>53 (23)</td>
</tr>
</tbody>
</table>

The value in the parentheses is the nation’s rank among 53 countries.

Hofstede measured his four dimensions in fifty three countries and then ranked the countries based on their position in each of the dimensions. Table 7.1 compares the position of the UK, Iran, the US and the Arab countries in these four dimensions. It is apparent that compared to the UK and the US, Iranian society is remarkably collectivist. In the individualism ranking, the US is the first; the UK is the third, while Iran is in the twenty fourth position. The power distance point is 80 in the Arab
countries and 35 in the UK. Iran’s position is between these two in Hofstede’s ranking with 58 points. The table also shows that Iran has the most feminine culture among the four.

7.4.4. Universalism versus Particularism
Schramm-Nielsen and Faradonbeh (2002) maintain that Iranians are always open to making new connections. They spend a considerable time on forming and nursing relationships. They also studied the ‘Universalism versus Particularism’ dimension among the Iranians and concluded that the Iranians are very particularist. They believe that Iranians choose their business partners first and foremost from a consideration of trust since the societal structures are such that they do not offer protection in case something goes wrong. As Faradonbeh (2002) states:

“Through a system of exchanging favours in informal relationships Iranians are used to doing each other favours to an extent far beyond what is common among most westerners.”

7.4.5. Short term Society
French writer Count de Gobineau, who travelled in Iran during the 1860s, mentioned in his memoirs that the past is the favourite subject of conversation between the people (Count de Gobineau, 1972). According to Yeganeh and Su (2007) past-orientation can be crystallised in terms of neglecting plans and setting short term horizons in decision making by Iranian managers. Similarly, Nazemi (2003) found out that Iranian managers are usually found to be impatient by their foreign counterparts.

Katouzian (2004 and 2006) introduces the concept of "the short-term society" or “Jameheh-ye Kolangi”, literally meaning "the pick-axe society", which is a reference to the Iranian practice of demolishing buildings after only a few decades, considering them to be "dilapidated". He maintains that Iran is a “short term society” in contrast to Europe which is a “long term society”. He explains in detail using evidence from both Persian mythology and Iranian history that this short-term nature has been
because unpredictable changes have happened more frequently in Iran throughout history compared to European countries. Based on his theory a long term society is able to accumulate capital, experience and knowledge for development and existence of a stable government makes the future reasonably predictable. Contrarily in a short term society history is made of a series of short term periods. In such a society extreme insecurity and unpredictability of the future does not encourage long views of life, as all positions, titles, land privileges and wealth is likely to be lost, if not by a person himself, then within one or two generations.

Katouzian (2010) admits that by the start of modernisation in the 1920’s and the formation of the modern state the government structure, along with legal and financial systems, the situation has been changed drastically, short term mentality is still an influential dimension in Iranian culture.

7.4.6. Paternalism
As the previous studies show Iranian management culture is the hybrid of ancient Iranian, Islamic and western values (Namazie, 2003; Kiani and Latifi, 1995; Mortazavi and Salehi, 1997). Its Islamic elements are aspects such as equality, justice and support and protection for subordinates; the ancient Iranian elements focus on power and control as the only measure for efficient management while the western management elements focus on flexibility and lower power distance.

According to Nahavandi (2009), paternalism is the dominant culture in Iranian organisations. Levinson (1968) associates paternalism with ancient kingdoms that required their soldiers’ ultimate loyalty. Though paternalistic managers often protect their subordinates, they can be very bitter against any feedback from their subordinates and even impoverish the subordinates by taking their responsibilities away (Aronoff and Ward, 1993).

Yeganeh and Su (2007) consider domination of paternalism as a natural outcome of high power distance and collectivism. Schram-Nilsen and Faradonbeh (2002) define paternalism in an employer-employee context as an authoritarian fatherliness in which a manager’s responsibilities are extended to an employee’s private life.
Dastmalchian et al. (2001) maintain that paternalistic managers feel obliged to protect their employees and even solve their personal or familiar problems inside or outside the organisation. Schram-Nilsen and Faradonbeh (2002) report that the employees expect their managers to help them in a variety of issues such as financial difficulties, illness in the family and even marriage disputes!

Ayman and Chemers (1983) and Chemers (1968) as sited by Nahavandi (2009) believe that Iranians’ ideal leadership is characterised by benevolent paternalism whereby the leader is a kind, warm, powerful, accessible and stern father figure.

7.5. Other Attributes of Organisational Behaviour
Wood (1997) reminds us that culture by itself is not enough and we should recognise the role of ideology and personality. As they cut across national culture and set a platform on which individuals from different cultures share a position.

Fard et al. (2010) refer to the great intrusion of politics in direction setting and strategy formulation of the public sector and assert that the context of public management in Iran is highly politicised, and changes in higher levels of management are often and frequent. Such conditions cause public sector managers to have a weaker power base and less authority in decision making and policy setting compared to their counterparts in the private sector. The public sector manager’s ability to act autonomously depends on a complex network of actors, rules and regulations. In many cases the interests of legislators, politicians and other hidden interest groups dominate efficiency and cost-benefit considerations in the public sector. In other words, the high turnover of the managers and extensive political influence make strategic management difficult in public organizations.

It must be remembered that the public sector plays the main role in the Iranian economy. The size of budget can be a good indicator of the importance of the public sector in the economy. According to the official budget data, public expenditure is 27.5 percent of GDP. However some estimates show a public sector twice as large, claiming about 42 percent of the GDP in 2000 (World Bank, 2003). This figure must be compared to 30 percent for Egypt, 20 percent for the United States and 15 percent for East Asian countries.
Karbassian (2000) argues that following the 1979 revolution government firms are under the management of young revolutionaries who were very faithful, but usually lacking in management knowledge and experience. This resulted in a considerable inefficiency in the business sector. Yassin et al. (2002) claim that the government still suffer from considerable bureaucratic procedures, mismanagement and corruption.

As illustrated in Figure 7.1, universal, cultural and personal preferences are in relation to each other. At the bottom of the cone are the biological characteristics of a human. At the top of the cone are the individual characteristics or personality of the individuals which is a combination of inherited characteristics, learned behaviours, preferences and assumptions. Culture lies between these two layers and has no clear border with the other two.

![Figure 7.1 Levels of mental programming (Source: Steer et al., 2010)](image)

It is not often easy to judge if a particular behaviour has its roots in culture or personality, however by comparing results of studies, one can attribute some differences to cultural issues.
7.6. Summary

The above mentioned cultural characteristics can affect the course of events, formation of disputes and people’s attitudes towards them in different ways. In this section these potential influences will be discussed.

In a collectivist society relationships are of great importance. People try to keep their business connections as long as possible; a sense of loyalty and trust often emerges between business partners and informal relationships are considered more effective than formal ones. In a project environment this attitude is generally reflected in the form of non contractual relations between the client and contractor on a ‘quid per quo’ basis and can be one of the causes for a low rate of litigation in Iranian oil and gas projects. [x]

High power distance usually leads to projection of decision making to the top management level where technical and legal matters play a less significant role than business strategies. Considering the dominance of government over the country’s economy, good relations with governmental clients is of utmost importance for private contractors. Therefore companies generally prefer to compromise and reach an agreement with their clients rather than litigate and jeopardise the stream of work in the future. So it can be said that the combination of high collectivism and high power distance often sets the basis for resolution of disputes in informal ways by negotiation.

Other characteristics of Iranian culture are short-term and past orientations. They can affect large-scale projects in different ways, for instance:

1. The frequent change of people in key project positions such as project manager, project director or a higher level head of the petrochemical company or even the minister of petroleum himself. For instance the minister of petroleum, who is the highest decision maker in the development of the industry and policy making, has been changed five times during the past six years. The changes in middle managers have
been even more. The client’s project manager in one of the case studies has changed four times during the project.

2. Assigning people without sufficient management skills and experience to key positions in public projects.

3. Change in market conditions due to change in government policies which can influence the contractor’s stream of work.

4. Change in procedures, regulations and permit requirements (e.g. change in minimum payment, custom regulations, etc.), that will increase the uncertainty of project conditions.

As mentioned before short term orientation can weaken the position of governmental managers (client in these cases) compared to their private counterparts (contractors). Newcomers often do not have enough experience and are not familiar with the history of works which causes a disturbance in the project. The change of regulations and decision makers can also intensify uncertainty and intrinsic complexity of construction projects in Iran, and eventually make the project more unpredictable than similar projects in Europe.

The other cultural issue which can have an influence on the client contractor relationship is paternalism. Though all scholars have studied paternalism in employer-employee relations and there is no direct reference to paternalism in inter-organisation relations in the literature, detailed interviews and case studies indicate that such relations exist between the client and their contractors in large scale oil and gas projects.

Support and empowerment of local contractors for performing large scale projects has been one of the established policies of the Iranian government during the last few decades. Considering the fact that in almost all oil and gas projects the client is the government, this strategy is reflected in procurement and contract administration procedures. There was even a rule passed by the parliament in 1995 which requires the government to give projects to joint-ventures of Iranian-foreign companies and supply at least 51% of the required materials from Iranian
manufactures. These policies often cause an increase in the total cost of projects, however the government accepts the extra cost for involving Iranian contractors in these types of projects.

As in the literature, for instance Bruijn and Leijten (2008) argue that large projects are often “multifunctional”. In these types of projects start up of the plant is not the only objective, other agendas such as producing jobs, transfer of technology, development of a certain area, etc. are often among the objectives of multifunctional projects.

The detailed interviews suggest that Iranian contractors who are involved in oil and gas projects are somehow working in a protected environment and there is a paternalistic relation between the clients and contractors in this sector. Such a relationship does not mean that there is no confrontation between the client and contractor; it is rather an unwritten agreement between the client and contractor which only protects the contractor against the worst which is bankruptcy and leaving the market. Therefore the situation is not comparable with business environments with a harsh free market reality, in which miscalculation in a billion dollar project can lead to a contractor’s bankruptcy. The case of Davy McKee is a typical example of such miscalculations.

In 1991, the British contractor Davy McKee became insolvent as a consequence of the contract conditions they had accepted in the construction of the Emerald Oil Field platform in the North Sea. Davy McKee had accepted a lump sum contract of nearly $100 million, payable in one single instalment upon completion. When they ran into significant cost overruns during execution, and could not obtain an extension of their financial backup, they were forced to sell off their successful businesses. Ultimately the Norwegian conglomerate, Kvaerner, took over the company (see Von Branconi and Loch, 2004).

The case studies and interviews which have been performed in this research (see chapter 8) show some cases in which contractors were on the verge of bankruptcy the client protected the contractor against insolvency, however contractors lost a considerable amount on the project.
In brief, three different roles for culture can be distinguished:

1. Reluctance towards litigation and tendency towards compromise.

2. High level of uncertainty due to frequent changes of people and regulations.

3. Client’s paternalism towards his contractors protects the contractors against bankruptcy should misfortune arise.
CHAPTER EIGHT – FIELD WORKS (PRESENTATION OF DATA & DISCUSSION)

Introduction
In this chapter the data obtained from Iranian major oil, gas and petrochemical projects are presented to support some of the findings of literature review section. As Iranian business culture surely affected the studied projects, major characteristics of the Iranian culture have been reviewed in chapter eight.

This chapter consists of three sections:

- **Section 1**: In this section two case studies are performed on nature, causes and final outcomes of disputes in two petrochemical projects.

- **Section 2**: In this section the results of semi structured interviews are presented.

- **Section 3**: In this section disputes in oil, gas and petrochemical projects which have been referred to a mediation office are categorised.

- **Section 4**: In this section outcomes of a questionnaire survey contractors and client project management teams are presented.

There as also a case study based on construction of Heathrow Terminal, due to significance of partnering, and T5 agreement on the literature on claim prevention. However, as it was more related to partnering issue, and based on the literature is comes in a separate chapter (Chapter X) in the literature review section.
In chapter seven the Iranian business culture is discussed, as the culture by definition is the way a group of people solves their problems, survive and succeed in their daily life (Trompenaars, 1997 and Swindler, 1986).

The four sections of this chapter draw a picture of types of claim, value of the claims comparing to value of contract, importance of different types of claim, causes of claim and practitioners attitude toward them.

In chapters three and four importance of flexibility in contracts and necessity of rearranging relationships after formation of disputes are discussed, this chapter shows how in practice project managers try to preserve the flexibility of contract to avoid discontinuation of the relationship and complete the project even in cases where contracts are very detailed and rigid.
8.1. CASE STUDIES

8.1.1. Introduction

These cases are selected as they can describe the nature of claims in major construction projects in Iran and dispute resolution methods used by the parties to contracts.

The cases have been selected from the most contentious cases in the oil and gas industry, however as interviews revealed occurrence of such disputes in oil and gas projects are not out of norm. One of these cases is an engineering and procurement project (EP Project) and the other is a construction project. These cases show different types of the claims along with their value, and can illustrate the importance of different types of claims. There are many researches that give a long list of different causes of claims (for instance see Love et al., 2009 and Bu-Bshait and Manzenera, 1990), however the amount of claims and their significance comparing to total contract value has rarely been discussed. This issue can be of great importance especially in major projects and as it is shown in the cases can influence people’s strategy and tactic in dispute resolution.

The study is inductive and is used along with the other data gathering methods to form a grounded theory study which map the situation of claim in Iranian major oil, gas and petrochemical projects.

8.1.2. Case Study A

Project A was performance of all works necessary for design, engineering, procurement services, supply of equipments and commissioning of a petrochemical plant with capacity of producing 600,000 tons of products per year.
In this project client was a one of the subsidiary companies of National Iranian Petrochemical Company and contractor was a European - Iranian joint venture. According to the contract the scope of work was included the followings:

1. Grant of rights, know-how and license and effecting corresponding payment to licensor for such grant of right, know-how and license to owner.

2. Preparation of basic engineering package as detailed in the contract, which shall be performed by the foreign partner in the joint venture.

3. Preparation of the detail engineering for the plant as detailed in the contract, which shall be performed by the Iranian partner in the joint venture.

4. Supply and delivery of equipments:
   a. Supply and delivery of Iranian equipments as specified in the contract by the Iranian partner in the joint venture.
   b. Supply and CFR (cost & freight) delivery of non-Iranian equipments as specified in the contract by the foreign partner in the joint venture at the port specified in contact.

5. The foreign partner in the joint venture shall perform technical services by dispatching vendors’ and licensor’s specialists at job site upon request of the owner.

6. Training of owner’s personnel on licensor’s reference plant as detailed in the contract.

Duration of the contract was 24 month after effectiveness of contract. Total price of contract was $115,000,000 which was broken down as follows:
Table 8.1 Break down of Contract price

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
<th>Percentage of Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment to the licensor</td>
<td>$9,280,000</td>
<td>8.1</td>
</tr>
<tr>
<td>Basic engineering:</td>
<td>$2,318,000</td>
<td>2.0</td>
</tr>
<tr>
<td>Detail engineering:</td>
<td>$2,500,000</td>
<td>2.2</td>
</tr>
<tr>
<td>Iranian equipments</td>
<td>$14,767,000</td>
<td>12.8</td>
</tr>
<tr>
<td>Non-Iranian equipments:</td>
<td>$83,639,000</td>
<td>72.7</td>
</tr>
<tr>
<td>Technical assistance:</td>
<td>$2,138,000</td>
<td>1.9</td>
</tr>
<tr>
<td>Training</td>
<td>$358,000</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>$115,000,000</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 8.1 shows the weight of different parts of the projects.

The contract was lump-sum and as clearly mentioned in the contract the price was fixed:

“**It means a Sum absolutely fixed (subject to adjustment only by change in the work) quoted by contractor either for this contractor or for a change in the work, which sum has been approved by owner either in the contract or in a notice or in a change in the work.**”

Contract was also very explicit about the time to completion and says:

“**The target dates and period specified under this clause are subject only to adjustment by ‘changes in the work, force majeure, reasons attributed to owner or third**
"parties acting on behalf on owner and suspension permitted under contract."

The project was commenced in 2003 and it was supposed to be completed by 2005. However, it has been disrupted for more than a year due to disputes between contractor and client. Finally in 2007 parties agreed on a resolution and eventually the project has been completed 2007.

Reviewing this case, in terms of formation of disputes and resolution of them can help the readers to understand the nature of disputes in Iranian major projects.

Total amount of claims made by contractor was 31 million USD (i.e. %27 of the total project price). Break down of claimed amounts and their portion in total project price can show importance of different factors in formation of the dispute.

As it is shown in table 8.2 more that %71 of claimed amount is related to economical conditions (item 2 and 3 in the table). According to tender documents pricing and all project payment was in USD, while the joint venture supplied most of the required material from European countries in Euro. Devaluation of USD against Euro was a great loss for the contractor joint venture so they requested for compensation.

Another economic incident during the project was abrupt increase in global price of steel and copper that affected price of equipments (e.g. vessels, towers, exchangers, etc.), steel structure, piping material, cables and other electrical materials such as transformers. On this basis the joint venture requested for adjustment of the original prices.

The rest of claims were not really significant comparing to these two items. However inefficient dispute resolution by parties and in some cases personalization of disputes made an adversarial environment that caused the disputes remain unsolved for a long time and project to be disrupted and delayed considerably.
Table 8.2 Break down of contractor’s claim

<table>
<thead>
<tr>
<th>Items</th>
<th>Amount</th>
<th>Percent of Contract Price</th>
<th>Percent of Claimed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Supply of out of scope material by the contractor</td>
<td>$394,411</td>
<td>0.34</td>
<td>1.27</td>
</tr>
<tr>
<td>2 Escalation</td>
<td>$5,344,936</td>
<td>4.65</td>
<td>17.19</td>
</tr>
<tr>
<td>3 Change in USD parity</td>
<td>$16,757,000</td>
<td>14.57</td>
<td>53.90</td>
</tr>
<tr>
<td>4 Change in the plot plan by the client</td>
<td>$2,551,859</td>
<td>2.22</td>
<td>8.21</td>
</tr>
<tr>
<td>5 Rework in design</td>
<td>$1,220,565</td>
<td>1.06</td>
<td>3.93</td>
</tr>
<tr>
<td>6 Demurrage cost attributed to client</td>
<td>$187,041</td>
<td>0.16</td>
<td>0.60</td>
</tr>
<tr>
<td>7 Prolongation</td>
<td>$890,700</td>
<td>0.77</td>
<td>2.86</td>
</tr>
<tr>
<td>8 Preferential supply of insulation (A change requested by the client)</td>
<td>$3,623,064</td>
<td>3.15</td>
<td>11.65</td>
</tr>
<tr>
<td>9 Re- supply of materials due to mishandling at the job site</td>
<td>$70,130</td>
<td>0.06</td>
<td>0.23</td>
</tr>
<tr>
<td>10 Transport by land instead of sea (A change requested by the client)</td>
<td>$49,841</td>
<td>0.04</td>
<td>0.16</td>
</tr>
<tr>
<td>Total</td>
<td>$31,089,547</td>
<td>27.03</td>
<td>100</td>
</tr>
</tbody>
</table>

According to the contract, the procurement of major equipments (major equipments are defined in the contract) is subjected to client’s approval on vendor. Though a list of vendors who are approved by the client for supply of these equipments is prepared at tender stage contractor has to send technical bid evaluation (TBE), along with information of winner of the bid to client for his technical review and approval.

At that point the disputes started. The Clients’ technical team wanted some of major equipments; for instance plant’s main compressors and pumps to be procured from a certain supplier, while the licensor had suggested another vendor whose price was
the base of contractor’s estimation and pricing in bidding stage. Buying from the suppliers recommended by the client could double the cost and was not acceptable to the contractor. The contractor explained that their vendors are approved recommended by project licensor and they are selected from the agreed upon approved vendor list, but client’s technical team insisted on procurement of the most expensive equipments. Lengthy negotiation and bargains started and after a year the parties agreed on supply of some parts and components from the suppliers requested by the client and montage of them by a 3rd party vendor.

Change of equipments means that design contractor has to wait for receiving updated vendor information before he can complete the drawings. For example equipment’s foundation drawings can be issued only after receiving weight and vibration information from the suppliers.

Contractor’s project manager describes the situation and its effect on the project progress as follows:

“We spent a lot of time on some of the main equipments, trying to get agreement by months and months. That cannot help the project, that’s where the conflict gets built in and you end up adding years to the end of the project. And then some individuals in the client system say “I want this, I want that. I want that kind of pump. I don’t care what has been said in the contract. Or it’s said in the contract and I absolutely want it, then it all of that delays the delivery of the project. Then it costs money. Now a lot of individuals say “well, that’s not my responsibility. Not my problem. You know I’m only asking what is said in the contract, and you won’t give it to me Mr. Contractor”. You can take this line but at the end someone must be responsible for the whole commercial life of the project, and [project A] took 3, 4 years more than what it should have.”
At the same time client made some changes in the plot plan. The plant was part of an olefin complex and for some reason the client decided to change configuration of different units in the complex, and the plot plan changed consequently.

Combination of these two incidents imposed a considerable delay to the project, which caused client’s dissatisfaction.

Despite the joint venture’s disagreement, client decided to hold tender for construction of plant when design reached only 60% of its progress. By beginning of the construction at site client put more pressure on the joint venture to compensate its delays and submit the remaining of drawings and material to site.

By this time aforementioned financial incidents put the joint venture in a very difficult situation. The client refused to accept contractors request for escalation and remedial actions and postponed it to after completion of material and drawings delivery, the client even put some of the contractor’s invoices on hold.

Adversity between the parties escalated, and disputes became personal between the parties and client requested contractor project manager to be removed. Changing project manager couldn’t solve the problem and the project went effectively on hold. Though the joint venture continued to furnish remaining drawings, they stopped sending material to site due to their financial problems.

Meanwhile construction was in progress at site and designer contractor believed that construction contractor has enough material to keep on with work.

Finally after about a year of disruption and change of project managers in both client and contractor organizations the parties reached to an agreement. In this agreement both parties acknowledged that:

- The original contract has been signed on Aug. 2001.
- Contract became effective on May 2003.
- Delay in effectiveness of contract has had financial and schedule impact on project.
• From time to time owner requested contractor to carry out certain changes to the scope of work

• Owner recognises that such additional expenses are not to contractor’s account and agrees to compensate the contractor for such additional expenses.

• The parties have many claims against each other that they wish to settle.

And they agreed that:

1. The parties agreed that delay liquidation damages contemplated under the contract before the signing date of the amendment whether notified or not should be deemed not applicable.

2. Owner agreed to pay a certain amount for the changes.

3. Outstanding material will be sent to site on agreed upon dates

4. Maximum liability for delay Liquidation damage will be limited to 3 percent of the cost and only applicable to equipment and material.

5. Any shortage in material due to contractor’s errors and omissions in drawings shall be procured and dispatched to the site in shortest possible time.

6. In consideration of the actual progress of the project, the parties agreed to reduce the amount of performance bank guarantee which had be provided at the beginning of the project.

7. Contractor also confirmed that he will dispatch vendor’s specialist for assistance in installation upon client’s request.

Finally engineering and procurement project finished in 2008 and subsequently the plant became operational in 2009. In 2010 the value of the products was more than 750 million USD [See http://www.shana.ir/152097-fa.html].
There are some important issues about this case that has influenced formation and resolution of claims:

1. There were only two companies who were in possession of license for this plant at the time. One of the companies was American which couldn’t enter to business with Iran due to US government sanctions against Iranian oil and gas industry. Therefore there was only a single source for obtaining licence.

2. There was not any plant with similar capacity (600,000 tons of products annually) in the world. Therefore design contractor and licensor had to scale up the available designs to meet client’s requirements. The scale up process entered many uncertainties in design and consequently in procurement activities.

3. At the time the contract the global price of the product was around 25 cent per pound, but in 2008 the price reached to over 70 cents per pound (Omni Tech, 2010). Under this circumstances client was ready to compromise with accepting more payment and start up the plant sooner.

Engineering and procurement (EP) joint-venture project manager believes that given all uncertainties about this project, cost plus was not a good choice for procurement rout. He maintains that:

“... what I’m saying is a lot of owner’s operators clients have gone to different kind of contracts that is facilitates the engineering and the procurement and the construction without engaging in too much conflict and change management. If you can minimize the conflict you will increase the speed of the project and the last thing you want is a contractor abandoning the site or a contractor not being able to refusing to finish the design or supply material because he is in conflict with the client. Again you might fight over 10% of the price and like I said when you are operating you get 500%"
of that amount in a few month of production, but may be it’s easy to see in ... a lot of clients doesn’t see this in that way. “

When he was asked to compare this project with a similar project they which they have done for another subsidiary company of NIOC he said:

“I think the level of dispute was quite high, I can compare it directly to another petrochemical project we had in Iran, and that project has less conflict in all the phases design, procurement, and I suppose through the construction.”

Given that project structure, project nature and contract contractor organisation and even client organisation were the same in both project he concluded that:

“I think the people were different. The approach of people was different. [when I compare these two project] people from client side was different and behaved differently in project A comparing to the other project, I would say. So, it was more difficult in project A. In this project people’s interpretations of the contract and their attitude which goes with that was a lot more aggressive. That made the project more difficult to handle to make progress.”

He also referred to financial problems and maintained that projects usually starts when the fund is not available, therefore client ask contractor to start engineering without ordering equipments. But dependency between vendor information and design often causes delay:

“there is delay in all of these projects. Because of the waiting for the finance to be putting to place. This seems to be a common problem with all Iranian projects waiting for finance to start the only engineering phase of the work until the main
money is available to procure the equipments and materials. That builds the delay.”

He believed that change in key personnel in the project was another problem

Client’s project manager changed four times during the project. We got decisions that have been agreed several years ago on something and then revisited several years later by different people to say “why we are doing that? You need to tell me why? Why was this agreement made? We have to do it this way.” And I have not experienced that in project B in which people in project management team were the same.

He also suggested that lack of experience in client project management team let some decision makers to make conflicts personal and put their personal judgement ahead of project and organisational strategies and it damaged the project:

“The attitude of the client was very aggressive, very hard nosed, and difficult to deal with. I think at the end it didn’t bring to the client what he has really wanted. Because he wants the plant to be completed as soon as possible and operates to take his money back. We have an expression in English it’s called “Penny wise and Pound foolish”. People worries about certain areas because people like to win, don’t they? Some people like to come out on top, and you can come out on top in the personal way as a project manager and insist that everything be done exactly like that but that won’t necessarily means ... you know you got you 1% or 10% but the 100% got delayed or turned into 200% cost. I think these people don’t have the experience to see the out come of their decisions.
8.1.3. Lessons from Case study A

By looking at the break down of contractor’s claim it is apparent that 71 percent of the claimed amount is related to economic incidents which are out of contractor’s control (i.e. global increase in price of raw material and change in US Dollar parity). Taking into account that the contract was fixed price, these risks must have been considered by the contractor at the bidding stage, and claims are assumed as a claim for *ex gratia* payment.

Though accepting such claims in major projects is not out of norm, adversarial environment and some personal clashes between members of client and contractor management teams causes the claim to be remained pending.

Being in financial difficulty contractors stopped supply of material to site in order to force client to accept their requests. In this stage the project had reached %80 progress it was practically impossible for the client to remove the contractors and assign another contractor to complete the job. As it is discussed in chapter three this is due to high asset specificity of the unfinished plant.

Though the contract clearly expresses that:

“If contractor or any of their subcontractors fail to perform and complete the work or any part thereof in accordance with the contract...owner will send a written notice to contractor to take corrective action. If corrective action is not commenced within 10 working days after the date of the said notice then owner may terminate the contract wholly or partly and perform such work or a part thereof or have it performed by others. All direct expenses incidental or consequent there from which exceed sums which would have been paid by owner if contract have been normally performed shall be borne by contractor and shall be recoverable by owner from any amount due and payable to contractor. Corrective action in this clause means any
reasonable action undertaken by contractor aimed to solve the problem.”

The costs of redoing all designs, reordering remaining materials and risk of even more delay in completion of the project made substitution of another contractor practically impossible. Even if the client wanted to accept all costs and substitute the contractor, licence issue would prevent them of doing so. As the design contractor had an agreement with the only available licensor.

Criticising contractor’s behaviour doesn’t mean that client had no role in formation of a full blown dispute. A lack of coherent decision making and presence of individual areas of concern without paying attention to overall aim of project caused enormous problems in the project.

Client decision makers in many cases turned technical and financial disagreement into personal issues and reached to the point that asked joint venture project manager to be removed from his position. Even that change couldn’t solve the problems. Finally top management of Client organisation had to intervene and accept contractor’s claim to complete the project.

8.1.4. Case Study B

The project was construction of the world’s biggest aromatic plants in the South of Iran. The capacity of the plant is 1,280,000 tons aromatic products along with 3,200,000 tons of by products. At the time of project start up value of the annual production of the plant was 2 billion USD.

The project has been procured as EP+C. It means that a joint venture of Japanese and Iranian companies obtained the licence for the plant and performed basic and detailed design, and material procurement for the project, later on tender has been held a joint venture of three Iranian companies has been selected for the construction works. Management Contract (MC) services were provided by a British company.
This case study is focused on the construction part of the project. The cost of construction was originally estimated 645,000,000,000 Rials (around 80.6 million USD). After finalizing bills of quantity (BOQ) project price increased to 792,358,000,000 Rials. Due to elongation of the project the client accepted the responsibility of some of the delays and applied an escalation factor of 1.69 to the project price which increased the total price of contract to 1,030,736,980,000 Rials (around 129,000,000 USD) which is 60% more than the first estimation.

The project was expected to be completed in 26 months however it took 58 month which means more than twice the planned duration.

Project suffered from delay from early months of project through the end and client and MC notified contractor of that and made suggestions for improvement of planning.

A report by MC shows the frequency of the problems raised by both parties in the site Minutes of meetings (MOMs) as presented in table 8.3.

**Table 8.3 Frequency of problem raised in site minutes of meetings**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction JV mismanagement</td>
<td>14 times</td>
</tr>
<tr>
<td>Lack of skilled human resources and plants at site</td>
<td>973 times</td>
</tr>
<tr>
<td>Problem in contractor’s planning</td>
<td>407 times</td>
</tr>
<tr>
<td>Quality of works</td>
<td>88 times</td>
</tr>
<tr>
<td>Lack of coordination and discrepancy of works at site</td>
<td>113 times</td>
</tr>
<tr>
<td>Delay in supply of material in contractor’s scope</td>
<td>161 times</td>
</tr>
<tr>
<td>Problems with drawings and material in client’s scope of supply</td>
<td>117 times</td>
</tr>
</tbody>
</table>

The project was behind the schedule from the early months. For instance at the end of the first year project progress was %26.9 whereas according to the schedule it was supposed to be %47.9; that means actual progress was %56 of the planned progress.
Project reports show that due to project delays and increasing difference between actual and planned progress, contractor mismanagement and concerns over quality of the performed activities client decided to remove the contractor and assign another contractor to finish the project. The client even issued two termination notices in December 2003 and August 2004.

However, considering the difficulties of replacing the contractor and the fact that it can cause even more additional cost and delay, contract has been amended and contractor continued working on the project. The key points of this amendment were:

1. Accepting part of delays by contractor
2. Escalating invoices and payments from April 2004.
3. Contractor confirmed that he has no other claims whatsoever.
4. Contractor committed to complete the project by June 2005.
5. Client is entitled to ask compensation for loses due to contractor’s

By completion of the projects contractor send a 55 page claim to the client asked for compensation of his losses due to elongated work and client miss management.

Client submitted an equally detailed counter claim answering each part and proving that contractor herself was the soul responsible of the delay and cost overrun in the project.

At the end after two years of negotiation parties reached to a compromise. Contractors claim has been nullified and client waived his right for demanding compensation over the delays.

The main items of the contractor’s claim and client’s answer which has been prepared by the MC are as follows:

1. Delay in submission of equipments supplied by the client and drawings to the construction site which changed the sequence of work and caused delay.
The client claimed that in most of the cases the material was available at site a few months before the contractor started installation works. Moreover according to General Description section of the contract:

“The construction contractor’s scope of work shall include: Preparing remedial plan where late materials and equipment delivery or other construction problems arises.”

Also in an article on updating the project schedule clearly expressed that:

“The level 3 schedule shall be revised as more detailed information become available and progress updated constantly, and shall be issued to the owner.”

The MC also rejected the claim about delay and out of sequence submission of the drawings and maintained that during the 5 years of project, lack of resources has been always discussed in the meeting between client and contractor and it shows that contractor has always had enough drawing to work should he had enough resources in the site.

2. Changes in:
   
   • Isometric drawings
   
   • Position of trays in towers
   
   • Steel structures

Which caused disruption and rework.

According to the MC, revised isometric drawings was issued before commencement of works by the contractor. So the revising of drawings cannot be accepted as source of claim. The changes in piping drawings and subsequent changes in pipe supports was only %5.5 of the project inch diameter and %2.5 of total weight of project pipe support. Considering the fact that more than %25 contingency was seen for pipe
support materials, the effect of aforementioned changes on materials were well covered.

According to contract, contractor must see the cost of cutting, welding and fitting in structure installation unit price. In cases where steel structure had serious problem the EP contractor has sent vendor’s repair team to site to solve the problem.

3. Limitations and unsuitability of specified land for erection of spools and material storage.

The contractor had seen the job site during the tender and received all information during the clarification meetings. Contractor’s failure to effective material management and control not only caused delay in the work but also caused a considerable amount of material to be wasted.

4. Quality of insulation for under ground piping which causes corrosion and required rework.

Contractor claimed that low quality of insulation material supplied by EP contractor caused severe corrosion if underground piping which ultimately caused extensive rework and replacement of pipes. The client and MC on the other hand believed that contractor has hired an unskilled subcontractor for underground works, and despite a series of letters from the MC which drew contractor’s attention to that point, contractor failed to take any remedial action.

Apparently small amount of insulation materials (less than %3 of the supplied insulation material) was not as described in the project specification, and after raising the issue by construction contractor, EP constrictor has substitute the wrong delivered materials. Three years later construction contractor claimed that corrosion in underground pipes was due to that small amount of faulty materials.
5. Mechanical completion as specified in the contract is not possible.

Mechanical completion and its conditions are clearly defined in the contract. Contractor has been informed of these conditions by bid clarifications at bidding stage.

The contract also expressed clearly that construction and pre-commissioning activities can have overlaps.

6. The client has not followed contractual requirements for change-order (or change-request) during the project.

As it was recorded in the minutes of meetings (MOM), in the second year of the project, the contractor formally requested MC to substitute “field instructions” which needed to be signed by both MC and client’s representative with MOMs (or verbal process) between contractor and client/MC representatives. Both client and the MC rejected this requested at the time, however later contractor sent their request to directly The National Iranian Petrochemical Company (NIPC) and claimed that changing the procedure would enable them to save time, and their request granted by the NIPC.

According to the contract contractor is required to submitted change request form not later than 2 month after executing the change, nevertheless there are many cases in which the contractor has submitted the form 6 month or even a year after implementing the change.

7. Delay due to Off-site utility supplier failure to provide utility at site boundary on time.

Though off-site utility lines were connected with delay, construction contractor’s progress was %52 at the connecting time. So water was the only utility needed by
the contractor at the time, and it was available at the site, however using contaminated tanker affected quality of concrete in more than one case.

8. Construction contractor loss due to project elongation and disruption in project activities.

Client and MC rejected this claim because they believed that most of the delay in completion of the project was due to construction contractor’s mismanagement. The client accepted the portion of delay for which he was responsible and applied an escalation factor of 1.69 on costs to cover contractor’s losses due to that. The client also absorbed the losses which were due to factors out of contractor’s control.

At the point where progress of the project was %91 contractor declared via a formal letter that all invoices had been paid and expressed that he has no claim over delay in payments what so ever.

Finally after a year of negotiations the client did not accept any of contractor’s claims, however he waived right to demand liquidating damage for contractors’ delays and a kind of compromise was made.

8.1.5. Lessons from Case Study B

Key dates of project can be summarised in Table 8.4.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 2002</td>
<td>Start of construction works</td>
</tr>
<tr>
<td>Dec. 2003</td>
<td>1st Termination Notice</td>
</tr>
<tr>
<td>Aug. 2004</td>
<td>2nd Termination Notice</td>
</tr>
<tr>
<td>Dec. 2004</td>
<td>2nd amendment was signed</td>
</tr>
<tr>
<td>Jun. 2005</td>
<td>%90.97 Progress (Project was supposed to be completed based on the 2nd amendment)</td>
</tr>
<tr>
<td>Dec. 2007</td>
<td>Project Completion</td>
</tr>
</tbody>
</table>
The project was well behind the schedule from the early months and the difference between the actual progress and planned progress increased by time. The Client and the MC sent many notices to contractor and offers assistance in planning the works, but the contractor rejected their offer. The project records show that the contractor had not enough resources to follow the schedule during the course of the project. There were also some organisational problems in the contractor’s organisation, for instance the site manager was changed 4 times during the project and each time the change slowed down the activities in the site.

Being worried about the slow progress of the project, the client sent two termination notices to the contractor. Although the contract had provisions for removing the contractor and substituting another contractor to finish the work, it was practically impossible due to scale of the project and high asset specificity.

Eventually client decided to make an agreement with contractor. He accepted most of the delays and agreed to apply a multiplying adjustment factor to the remaining payment hoping that it would improve the contractor’s financial condition and would benefit the project. The progress rate increased right after these changes, but the last % 10 of work took more than a year to be completed.

By completion of project contractor took a pre-emptive measure and submitted a claim to protect himself against client damage for delays. In response, the client and the MC replied to contractor’s claim and prepared a counter claim. However client’s top management decide to waive his right to demand liquidation damage and closed the case.

This case study (as well as the previous one) can be an example of compromise between client and contractor over claim issues in Iranian major projects.

The study also shows that even a rigid EPC-turnkey contract which is many ways one-sided cannot protect clients’ interests. Looking retrospectively at the project is apparent that the project is completed 32 months late and 60% over budget, and the client couldn’t get any compensation from the contractor. This is another example of
cost certainty fallacy of lump sum contract which is discussed by Flybvjerg (2002) and Rowlinson, (1999) (see chapter three).

In the next section the behaviour of client and contractor organisations in respect to claims have been studied by looking at the cultural dimensions of Iranian society and Iranian business culture.
8.2. Interviews

8.2.1. Introduction

In this section the main outcomes of 16 hours of semi-structured interviews with lawyers, project managers, commercial managers and CEOs of engineering companies who are involved in oil, gas and petrochemical projects are discussed.

Using critical incident technique the interviewees are asked to speak about the worst cases of dispute they have ever experienced. As described in the methodology chapter the interviews have been coded line by line; later the repetitive themes have been developed in the form of statements and supportive literatures have been added (see chapter five).

These discursive descriptions show the practitioners’ perceptions of claim issues in major construction projects. For each interviewee a brief profile has been prepared which is annexed to the research. Given the anti-positivist nature of the research, these profiles can show from what perspective each interviewee is looking at construction claims.

8.2.2. Claim as a Contractor’s Right

Many interviewees, especially those from construction contractor firms have concerns regarding the demonising of claims in the industry. According to them claim is currently a taboo in public infrastructure projects. As a contractor explains:

“Clients often brand contractors who try to protect their right as ‘claimant contractors’ and such contractors often face difficulties in getting jobs.”
They see claim as a contractor’s legal right for receiving compensation for his losses in the project.

“It’s only natural for a contractor to use claim to get compensated for his losses. A claim does not necessarily mean a litigation... we prefer to get what we are entitled to without referring to the court.”

Another project manager emphasises that making a claim does not mean that they seek litigation and adversarial relations, as he said:

“A claim can be accepted or resolved by negotiation, that is the best case for both client and contractor, but it must be raised anyway.”

The FIDIC standard forms of contract which are approved by institutes such as the World Bank for development projects have provisions for contractor claim in many cases. For instance the Red Book has 23 provisions for construction contractors’ claims, and the Silver Book (for EPC Turn-key project), in which most of the risks are on contractors’ shoulders, contains 17 provisions for contractors’ claims.

The literature supports the idea that claim is a legal mechanism for obtaining one’s right, for instance Jaeger and Hök (2010) expressed that:

“... Claims are nothing more than crystallisation of an anticipated, not yet specified, part of the contract price. In principle the agreed Time of Completion is open for extension claims, because nobody can anticipate what will happen during the whole course of the work”.

They maintain that claim is nothing more than a legal feature that enables parties in a contract to crystallise final contract price and time to completion. However, they stress that claim must be presented under the strict procedural rules provided in the contract.

The problem arises when one of the parties or both try to use claim to maximise their own profit, and unfortunately most of the time that is the case. As discussed in
chapter three, asymmetry of information in agent-principle relationships makes the situation susceptible to opportunistic behaviours in the project.

As a contraction lawyer said:

“It is a popular trick among some contractors to under bid, and try to make their profit from claiming. These contractors plan for their claim even before the start of the project, and try to find a source for their claims from the first day of the project.”

8.2.3. Unrealistic Assumptions

Interviewees generally believe that the specified time for completion of the projects is not realistic, and in reality projects take much longer to complete. Due to such unrealistic assumptions delays in completion are very common among the projects (Naimi et al., 2008).

As a commercial manager said:

“The specified time to completion of a project in a recent tender was 30 months but everybody knew that it would take at least 5 years.”

They believe that client organisations (subsidiary companies of the Iranian Ministry of Petroleum) are under increasing pressure from the Ministry to make plants operational as soon as possible, especially those plants which receive their feeds from shared fields and other countries are already extracting. They often forget the fact that the natural sequence of work should be passed and it takes time. As a contractor put it across:

“It takes nine months for a foetus to become fully grown in the womb. A premature baby can be born after eight months and survive but a seven-month baby has no chance. That is the same with projects. You can fast track a project to save
The same problem has been observed more or less all over the world. Rolstadås et al. (2011) claim that most owners of energy industries are not able to reliably predict the duration and cost of their major complex capital projects. Flybvjerg (2002) studied 246 infrastructure projects in 20 countries over the last century and concludes that actual cost of rail projects averaged 45% higher than estimated, tunnels and bridges 34% and even roads overrun by an average of 20%. In the UK in a study commissioned by HM Treasury infrastructure projects have been reviewed over a period of 20 years and it has been concluded that most of these projects have been suffering from “optimisation bias” (Mott MacDonald, 2002). “Optimisation bias” is defined as a tendency for the cost or duration of the project to be underestimated and benefits of the project to be overestimated. The study suggests that optimisation bias is caused by failure to identify and effectively manage project risks. Mott MacDonald’s study associates optimisation bias to lack of experience and maintains that by learning from the past projects optimisation bias can be reduced.


I. Technical causes

From a technical point of view optimisation bias can be referenced to:

1. Imperfect information.
2. Scope changes. When the scope and ambition of projects change many times during the project life cycle it can increase the cost of the project significantly.
3. Management. Projects that go seriously wrong often have a problem with their initial documents (i.e. basic package or tender documents). Projects that are performed better than average are not less complex but are just managed better.
Similarly Mott MacDonald (2002) identifies inadequacy of the business case as the main source of optimisation bias in engineering projects.

II. Psychological causes

Usually both engineers and authorities are very keen to build a plant; this mentality can cause them to be optimistic in their assessments and decision making which leads to approval by the financers and commencement of the project.

III. Economical causes

When a project goes forward it generates work for engineering firms, positions for people who are involved from the client organisation and economical benefits for both groups. If these people are involved in decision making or can indirectly influence the outcome of the decision making process it is more likely that the project will be built.

IV. Political-Institutional causes

A key question which needs to be answered is whether cost and duration forecasts are biased to serve the interest of project promoters in getting a project funded and started. That can even be an issue of deception, whether the promoters intentionally deceive project sponsors or whether the deception was an inappropriate routine created by an institutional set-up. As Flyvbjerg (2004) reports, despite the importance of this issue no inquiry has been done on patterns of misleading forecasts.

In the case of oil and gas projects these points should be considered:

- To make the construction period shorter and project more attractive to the financer (most of the projects are constructed using buy-back arrangements with international oil companies or loans from development banks).
• There are currently many development plans and the decision makers have to choose some of them for execution. Subsidiary companies can generate work and revenue for themselves by making their business plans more attractive to the decision makers.

• Currently the market of oil and gas projects is mainly controlled by clients and the contractors have to play by the client’s rules. Therefore, even if the contractors find the assumptions unrealistic they bid for the work and try to find some mechanisms for extension of the time during the execution phase.

• Adopting the aforementioned strategy by the contractor (or both client and contractor) can increase the potential of claims and disputes in the project.

8.2.4. Ambiguity in Contracts
Generally, tender documents form the body of a contract after the addition of the “contractor’s name” and “total price”. Therefore unclear tender documents lead to vague contracts which have very high potential for formation of disputes and claims.

Some of the areas that often are not clear cut in tender documents are:

• Scope of work.
• Split of responsibilities between client and contractors (and between the contractors themselves).
• Change order procedures.
• Documents and materials which need the client’s approval.

When facing an unclear area in tender documents, contractors adopt one of these two approaches: They either raise the matter and request clarification that can draw another competitor’s attention and decrease the contractor’s chance to win the tender, or they bid based on the lower price and mark the area to be used for a claim later. The latter is quite opportunistic behaviour but it is not uncommon in
construction projects, especially when the client project management team does not have enough experience.

Kadefros (2003) believes that the major sources of conflict in construction are contractors’ claims for additional payment due to changes, errors and omissions in the contract document. Based on research into Swedish contractors’ behaviour’s she reports that in competitive bidding, if contractors find a problem in tender documents they are encouraged not to disclose the problem while preparing their bid, as they may anticipate a profitable change order and reduce the tender price to be more competitive. After signing the contract the contractor is entitled to claim both for the work and for disruption and re-planning of construction works.

8.2.5. Unfair Clauses
In some cases clients put unfair clauses in the contract to transfer risks beyond the contractor’s control to him. Some of the examples are:

“Contractor shall update his work schedule based on the submitted drawings.”

Known as disclaimer (or exculpatory) clauses, these clauses try to transfer one party’s risk to another by contractual terms (Hartman, 2000). In other words these clauses intend to remove the client’s liability in the contract and often in tort (Kozek and Hebberd, 1998). By inserting a disclaimer clause in the contract the client intends to reduce the overall cost of the project, however many studies show that such calluses are influential in increasing the cost of projects in the construction industry by causing long and costly disputes (among others Jergeas and Hartman, 1998 and Zack, 1996 and Zaghloul, 2003). According to Zaghloul (2003) when a contractor faces a disclaimer clause in the contract and he has no tool by which he can control the outcome of the risk, he must either insure himself against it or add a contingency to his bidding price. These strategies can increase the contract price by 8 to 20 percent. He adds that disclaimer clauses can deteriorate the relationship between the client and contractors and increase the potential for claims and disputes.
Ultimately the contractor will not finish the work when he feels that he is losing money under unjust circumstances. To finish his project, the client has to satisfy his contractor. As a veteran project manager said:

“No contractor completes the project, spending his own money. If the client wants to have his plant completed, he should keep his contractors satisfied.”

Similarly Richbell (2008) maintains that one-sided contracts eventually fail and lead to disputes. He argues that unfair contracts breed a feeling of injustice and tempt contractors to behave opportunistically.

As Von Branconi et al. (2004) suggest, the client should not dictate any condition to the contractor no matter how powerful he is, as virtually always both sides have the opportunity of shirking during the course of the project.

8.2.6. Detail Contracting vs. Non-contractual Factors

There are controversial points of view among interviewees regarding the role of the contract and the level of detail that must be discussed in the contract. The first group believe that the contract must be as detailed as possible and spell out all possible situations and conditions. They maintain that more formality means more clarity and less opportunism. This is currently the dominant idea. The contracts and their appendices are often very complicated and exceed 10,000 pages.

The other group believes that though the contract must be clear, the more provision you add the more you limit yourself in the project execution stage. A veteran project manager remembers how major projects like “Tehran Refinery” were performed with a 300-page contract and without any serious dispute. Another project manager told the author that:

“I have seen people who insisted on inserting a clause in the contract during the contract drafting and later on blamed themselves for doing so.”
Nevertheless, they emphasise that although an expert project manager can handle less restrictive contracts using his experience and ingenuity, such contracts in the hands of inexperienced project managers will cause chaos.

People’s reliance on contracts is also very different. A project manager criticised the attitude of those managers who:

“Carry a copy of the contract in their pockets, and when you ask them ‘how do they do?’ They refer to the contract to find an appropriate answer.”

While a construction lawyer believed that clients’ project managers often run the project based on their experience from previous works and not based on the contract, he expressed that:

“Contracts often remained in the lowest drawer of their desk and are not referred to before escalation of conflict to a full-blown dispute.”

It seems that these divergences resemble deference of classical and relational contract theories. The client’s attempt to draft a detailed contract sometimes backfires. He tries to foresee all possible events and considers a contingency for them, but during the course of the projects he sees himself in a situation where an action different from what he has mentioned in the contract is more beneficial.

The CEO of a construction company expresses:

“A detailed contract often limits the client’s choices in dispute resolution (especially when the client is a governmental organisation) and can cause delay or even disruption in the project. At the same time costs increase and eventually the client has to accept, delay in project, cost overrun and part of the contractor’s claim.”

Ariely (2011) distinguishes between two types of contracts: Complete contract and incomplete contracts. Incomplete contracts set out the general parameters of the
exchange and leave the unexpected consequences to be covered by social norms governing what is appropriate and what is not. The complete contracts however leave nothing to social norms, if something is left out, or the situation changes there is no default to goodwill. He argues that complete contracting takes away flexibility, reasonableness and understanding and replaces them with narrow definitions of expectation that can be costly. Finally he concludes that as contracts are invariably imperfect, an incomplete contract that encourages goodwill is more reliable than a complete contract which transforms goodwill to legal trickery.

Loch et al. (2006) claim that complexity and uncertainty thwart complete contracts. They suggest that “open-ended contracts” should be used instead of specifying detailed outcomes in the contracts. Following Simon (1951) they affirm that an open ended agreement gives flexibility to cope with unknown unknowns.

Malhorta (2009) maintains that although contracts are essentially made to reduce risk and reinforce trust, when they are too detailed and rigid they can exacerbate the very problem they were supposed to resolve.

Parties in a contract often overestimate the level of certainty and underestimate the possibility of future divergence between realities and their expectations. Therefore they do not consider enough contingencies in the contract and attempt to finalise the terms even if it would be wiser to postpone settling some issues until the time when more information is available.

Parellada (2002) suggests that the presence of both predictable and unpredictable elements in a system implies that the system requires a balance between planning and control with freedom and creativity. Shenhar (2001) concludes from an empirical study that the higher the level of uncertainty, the more flexibility is required in the management of the project.

Andrade et al. (2008) maintain that as complex systems are inherently unpredictable they should be able to improvise. Improvisation means paying attention to feedbacks and openness to feedbacks.
Once again, a project manager’s behaviour is much closer to what Macaulay (1963) describes as:

“Businessmen often prefer to rely on a man’s word in a brief letter, a handshake, or common honesty and decency, even when the transaction involves exposure to serious risks.”

Greenburg (1975) as cited by McDonald and Evans (1998) defines modern construction contracts as:

“Theoretically the aim of a written contract is to achieve certainty of obligation of each party, the avoidance of ambiguities, and such defiance of understanding as to preclude ultimate controversy. In practice construction contracts are generally formed not to definitely fix obligations, but to avoid obligations.”

In the words of Floricel and Miller (2001), the very measures taken in order to stabilize the future and avoid the anticipated risk might reduce the governability of the project. In other words as project participants make commitments to deal with the anticipated risks they may constrain the governability of the project with respect to some future surprises.

Bettis and Hitt (1995) propose two “alternative strategic avenues” for dealing with uncertainties:

1. **Robustness**: This is the property of an organisation that makes performance immune to uncertain environmental fluctuations.
2. **Flexibilities**: which is the ability to (1) rapidly sense the change in environment; (2) conceptualise a response to the change; and (3) reconfigure resources to execute that change.

Floricel and Miller (2001) develop the notions of “robustness” and “governability”. In their view robustness refers to properties of a system that enable the project to deal with anticipated risks, while governability is a set of properties that enable a project to react properly to unexpected events. They maintain that governability develops and complements the notion of flexibility presented by Bettis and Hitt (1995).

Floricel and Miller (2001) performed a grounded theory research on large-scale projects and conclude that four properties of systems enable them to maintain their governability:

1. **Cohesion**: This is the property that results in participants staying within the project and solving their problems instead of leaving. The main source of cohesion is the bonds between the project participants which can be based on contractual securities as well as informal bonds between the people.

2. **Resources**: Reserves of financial and other resources enable project participants to absorb the unpredicted conditions and response during the crisis.

3. **Flexibility**: This is the property that enables a project to restructure itself whenever choices, actions or commitments change due to the occurrence of unexpected events. Contractual arrangements are one of the main sources of the lack of flexibility.

4. **Generativity**: This is the ability to develop creative responses to difficult situations caused by unexpected events.
In conditions of high adversity and disruption both robustness and governability are needed to achieve high performance on the dimensions of completion, social acceptability and economics. They present the logical pattern of conditions that lead to such performance as shown in Figure 8.1.

![Logical relation between environmental factors, system properties and project performance](image_url)

**Figure 8.1 Logical relation between environmental factors, system properties and project performance (Source: Floricel and Miller, 2001)**

Branconi and Loch (2004) also suggest that flexibility and power balance are necessary to allow a successful response to unforeseen contingencies requiring unforeseen actions. They believe that too detailed contracts which are focused on approaches rather than on the project end result will hinder such flexibility. At the same time if the power of the parties is not balanced, the weaker party will hide behind the contract to protect himself from being taken advantage of, rather than looking to an open minded win-win situation. They also point out that in a contractual relationship rarely can one side impose his will on the other side because the other party usually retains enough power to find ways to block or retaliate.

They suggest three means for building flexibility and power balance into a contract in order to be able to handle unforeseen uncertainties:

1. Using cost reimbursable contracts when project uncertainty is high.
2. By putting some space in the contract for manoeuvres by the parties, when the contractual levers are defined too narrowly it will end to legal testing of
the contractual liabilities rather than encouraging the desire to overcome the hurdle.

3. Under conditions of high uncertainty the parties are better advised to get interest alignment by sharing ownership of the project.

Loch and DeMeyer (2006) believe that fairness and early warning can be used to establish flexibility in the project. They believe that when unknown unknowns emerge during the project, the client is forced to change the project plan. Under such circumstances there is a high potential for taking advantage of partners. The principle-agent problem arises (see chapter three) and suspicion, protest, blockage, or at least subtle withholding of the best effort would be the natural reaction of the parties to changes if fairness is not convincingly demonstrated.

Kim and Maubrgne (2005) identify the bedrock elements of fairness in all diverse aspects of management as:

1. **Engagement**: involving affected people in decisions that concern them. In the project environment it shows a project manager’s respect for the stakeholders and their ideas. It often leads to a better decision by the manager and greater commitment from all involved in the execution of those decisions.

2. **Explanation**: ensuring that everyone involved and affected understands why final decisions are made as they are. It allows other parties to trust the decision makers even if their own suggestions have been rejected.

3. **Expectation Clarity**: Once a decision is made a manager should clearly state the new rules of the game.

They claim that the changes which are made following a fairness process are more easily accepted. It is not due to rational calculation but it is an emotional affair. Paying respect to people and being open to them deactivates the “cheating module” in their subconscious and allows them to trust and accept uncomfortable changes.
However, it should be mentioned that it does not override incentives, when someone loses in a project and the other wins, the loser fights for his right no matter how fair the process was.

An early warning system (or systematic communication) is another measure against uncertainties in projects. The willingness to release information about the emergence of unforeseen events and willingness to receive data from other parties and respond to them are main requirements of such an early warning system. In modern standard forms of contract claims are usually subject to claim notices. Sub-clause 20.1 FIDIC requires the contractor to give a notice of a claim if he considers to be entitled to an extension of the time for completion and/or any other form of payment. He shall do so as soon as practicable, and no later than 28 days after the contractor becomes aware (or should have become aware) of the event or circumstance giving rise to the additional payment or extension of time for completion.

Again, subject to sub-clause 8.3 a contractor shall promptly give notice to the engineer of specific probable future events or circumstances which may adversely affect the work, increase contract price, or delay the completion of work.

Moreover there are non-contractual factors that affect people’s behaviour in response to dispute. For instance scholars such as Axelrod (1990), Kamann et al. (2006) and Taazelar and Snijders (2010) argue for the effect of expectation for further works and history of previous works on people’s attitudes toward claim.

A CEO of a construction company adds profit margin as another important factor in a contractor’s decision to claim. He believes that when the profit margin is high, contractors are less willing to file claim:

“It is our policy to avoid claim as far as we can. We even had some cases in which our claims were accepted but we did not follow them, because they were insignificant compared to the profit we made in the same projects.”
“We saw another case in which a contractor who had claimed before was conditionally accepted in the next project; and the client requested that some people be removed from the project.”

8.2.7. Basic Engineering
In major projects, a feasibility study and basic engineering is usually performed prior to the bid for detail engineering or EPC (turn-key) projects. A basic engineering package is part of the tender documents and the contractor prices the work based upon it.

IPS-EP-R-150 (Iranian Petroleum Standard, 1997) defines the basic engineering package as “a set of documents which are sufficiently comprehensive to allow a third-party contractor to carry out the detail design engineering, procurement/supply of equipment and shall comprise of technical data and information as required.”

Preparation of a basic engineering package consists of only around 2% of the total project cost but its quality is highly related to formation of dispute or claim, as it is the basis of the bidding. Traditionally in the oil, gas and petrochemical industry basic engineering works are awarded to reliable and skilful companies without tendering as in this stage the quality of work and trust are far more important than price.

In recent years the Iranian Ministry of Petroleum and its subsidiary companies have awarded basic designs based on tender. This decision caused the quality of basic packages to be reduced. Practitioners believe that these basic packages contain errors, discrepancies between documents and in some cases the package is not complete. Therefore, the contractor needs to spend lots of man-hours correcting these documents. Moreover, the materials which were ordered based on defective basic packages need to be replaced or quantities need to be changed by amending purchase orders which impose additional costs to the contractor and delays in the project’s progress. Naturally, contractors claim for compensation of the cost associated to these changes and extension of time and that can be a source of dispute.
To overcome this problem some clients request the bidders to review and endorse the basic package documents during bidding. However, considering the limited time (usually 2-3 weeks) and resource a complete review is not possible and it is just a formality used for transferring all the risks related to the basic engineering package to the contractor. Contractors have to accept this unfair condition if they wish to get the work, however once the problems are revealed disputes arise.

The experiences of the interviewees show that the client has to compromise at the end if he wants to finish his project. It is a classic example of asset specificity. After signing the contract and starting the work, the cost of removing the contractor is so high that the client is not practically able to do so. As a site manager made a rather odd analogy:

“Once you make the client pregnant, the doors to negotiation are open!”

Awarding a basic package by tender intends to increase financial clarity, reduce the possibility of fraud and eventually reduce the total cost of the project. However, the project managers who have been interviewed believe that it works in quite the opposite way, as a poorly prepared basic package is a basis of claim and litigation in the whole project life cycle.

Scholars such as Reve and Levitt (1984) and Moitar and Kumaraswamy (2006) present the same idea that relations with engineers should be more trust-based.

8.2.8. Problems with Payment
The interviews show that clients, which in these interviews are all subsidiaries of the Iranian ministry of oil, have all delayed their payments. As the interviewees said:

“Our clients are always 4-5 months late in their payments.”

“Due to bureaucratic hindrances the client is not able to make a payment in less than 3 weeks, even if they do their best.”
The high degree of optimisation bias and unrealistic assumptions about the project alongside other inherent uncertainties often leads projects into cash flow problems. Clients do not have enough liquidity to make payments to the contractor or put in orders for materials on time. In some cases even clients have spent the contractor’s guarantee and faced difficulty in returning the money after commissioning and completion of project.

“According to law the client must keep the guarantee in a separate account and return it to the contractor as soon as the project completes, however our clients usually spend this money and are not able to pay us back. It sometimes takes us 3 years after completion to receive our money back.”

Contractors believe that in projects which have Iranian-foreign joint-venture, as the payments are made by using a letter of credit (LC) there are far less problems with cash flow and delays in payments.

Therefore it seems that using a “Project Bank Account” can reduce the problems with payments considerably.

8.2.9. Relational Contracts and Lack of Accountability

As discussed in chapter three, currently there is much attention to relational contracting, partnering and long term relations as measures for reducing construction claims. However, the interviewees from both client and contractor groups believe that such methods are not applicable to major public projects, as they can increase the risk of fraud drastically.

The CEO of a construction company asserts:

“Even now that the projects are awarded based on competitive tenders some public companies have special relations with the ministry which allow them to get projects more easily... “

“Relational contracting will be the end of private companies”
Takeyh (2004) observes that there is a network of “ostensibly private” companies in the Iranian oil industry which are spun off from the state sector and have valuable connections that make them compulsory partners of foreign companies who want to invest or work in the Iranian oil, gas and petrochemical sectors. The interviewees refer to these speculations and maintain that these procurement strategies are not applicable in Iranian oil projects, at least for the time being.

8.2.10. Compromising Over Claims
It is understood that clients often prefer to trade off a contractor’s claims for extra payment with their own counter claim for delay in completion of the facility. A delay in construction projects happens for different reasons, many of them caused by the client himself. However, presence of “liquidation damage “and other forms of penalties in the contract make the contractor liable for paying an amount to the contractor.

This attitude besides other factors is one of the reasons for a low number of cases which are referred to the court.

The CEO of a construction company explains the routine way of reviewing claims as:

“We usually resolve our claims via negotiation. Client usually postpones reviewing the claims to the end of the project and then weight the claim (as they call it themselves) and usually we reach an agreement based on give and take.”

“In my 41 years of experience as construction contractor, I haven’t experienced litigation more than 10 times... even in those cases the amount of claim was relatively low, say $700,000 in a $100 million contract.”

“The client project management team prefer to resolve claims via negotiation, as many of the claims are raised due to their mismanagement and they don’t want the issue to be reflected on the top management of their organisation.”
Inefficiency of the legal system in dealing with technical and construction cases is another reason for hesitance of both client and contractor in referring cases to the court. The Iranian judicial system has no special branch for technical litigations, construction cases must be judged in civil courts. Though the judges often consult specialist advisors, they have no information and training on the technicality of the case.

As a commercial manager says:

“How can we accept the judgement from a court that deals with divorce and inheritance cases on a daily basis on a billion dollar petrochemical plant case…. Of course I prefer to solve the problem via negotiation or even compromise.”

Other contractors believe that government clients are too strong for private contractors to engage in litigation. Moreover, the private contractor will risk their chance of getting new projects and actively staying in the market by entering litigation with such clients.

8.2.11. Lump-sum Contracts
Some interviewees believe that lump-sum arrangements are not suitable for projects on this scale and with this level of uncertainty. Technical complexity, interfaces and long duration of projects all impose an enormous amount of uncertainty upon the project. Despite doing their best, contractors are hardly able to analyse and manage the associated risks. As a project manager says:

“I’d say in a fixed price lump sum project with such complexity you will always expect claims from the contractor (and counter claim from the client). And if you go to the construction phase there are always claims from the party who does the construction works, because construction has even more of a risk. The conditions in which you are going to
build the plant are always variable, one bit affects the other. Foundations if not designed correctly, the structure doesn’t fit or the piping doesn’t fit, or equipment and there is no end to the complexity … we build layer on layer in a complex plan … it’s like buildings actually but our projects take longer because our equipment takes longer to be delivered and we have more disciplines involved and we have more scope for making mistakes or having difference in the way something has to be engineered and built. So, lump sum contracts in that area … will end up with claims.”

“I have experience over the years. I have gone through projects in the UK compared to 20 years ago we have less lump sum projects today because the risks people take are perceived to be high, and there is a risk of conflict and risk of losing a lot of money.”

They also report that currently most construction projects are awarded on a “unit rate basis because due to clients’ intentions to reduce the time to market period, tenders are held when the design is not completed. However, EP and EPC (turn-key) contracts are still mostly lump sum.

8.2.12. Holistic View of the Project

Different people have different attitudes toward the formation and resolution of disputes. People attribute these behaviours to different factors such as experience, management knowledge, personality, organisational culture, individual culture, etc.

A project manager with many years of experience in Iranian-European joint ventures said:

“People’s interpretations of the contract and their attitude which goes with that are a lot more aggressive in some
projects. [That] makes it more difficult to handle and to make progress.”

He believed that people make issues personal and want to win their own personal battle rather than thinking about the whole project:

“People worry about certain areas because people like to win, don’t they? Some people like to come out on top, and you can come out on top in a personal way as a project manager and insist that everything be done exactly like that but that won’t necessarily mean they won over the whole project. You can win in 1% or 10% of the work but the 100% got delayed or turned into 200% cost.... We have an expression in English it’s called “Penny wise and pound foolish.”

“I Think these people don’t have the experience to see the outcome of their decisions .It takes some experience to understand that messing around with the front end of the schedule like design is going to have a big effect further down the line in either delivery of the equipment, construction or furnishing the drawings. So I must say that repeating over the last 30 years that kind of experience has been lacking.”

A veteran project manager who has spent 35 years in client organisations also commented:

“What really matters is that the project managers be a Project Man. He or she should see the project like his child, care for it and try to solve the problems. A project manager should not be indifferent about the project and limit his responsibility to job specifications and other formalities.”

“People issues and their relationships are far more important than contractual issues. Our problem is lack of experience among client project managers, how do you expect someone
who has not built a house in his life to build a refinery complex? He simply doesn’t have project wise mentality”

“A project manager should have broad vision and see all aspects of project and their interrelations. Cost and time are as important as technical matters.”

As discussed in chapter four, in complex systems elements are highly interconnected and parts of a system can only be understood in terms of their relationships with each other and with the whole system.

A project manager should have a holistic view and see the project as a system, otherwise he will focus on specific areas and even enter serious disputes with contractors while forgetting about the main objective of the project which is usually completion of the work and generating revenue.

Case study A was a good example of this attitude, where a 31 million USD dispute deprived the client of the annual revenue of 750 million USD for two years. As a project manager said “this is Penny-Wise and Pound-Foolish”.

The managing director of a construction company experienced a totally different behaviour from the client in another project which saved both the project and the contractors:

“... We are responsible for construction works in an EPC consortium for construction of a refinery plant. Due to our partner’s errors in estimations of quantities the cost of project increased from 160 to 200 million Euros! We had no choice but to stop the work and close the site. There was no contractual mechanism for compensating our loss because the contract is very tight, but to save the project our client agreed to accept the new quantities if we reduce our unit rates by 30%. Of course it means that we make no profit but we will not end up bankrupt as well. “
8.2.13. Summary

The main outcomes of the interviews can be classified under the following headings:

Causes of claim:

Unrealistic assumptions (optimistic bias), problem with basic packages, tender documents, problems in payment

Contract:

The required level of Details in contracts is a controversial issue. Some of the interviewees believe that contract must be flexible while some others believe that the contracts must include suitable provisions for all possible events.

Interviews believe that Relational contracting is not suitable for major public projects as they reduce the clarity and accountability of project awarding.

Fixed price (Lump-sum) contracts are not suitable for major project with high uncertainties as there are so many factors which can influence the project and they cannot be predicted at the bidding stage.

Unfair contractual clauses and Ambiguity in contracts usually lead to opportunistic behaviour from on the parties and eventually a dispute.

People’s perception about claim:

Claim as contractors’ right. Interviewees maintain that claim is contractor’s right to demand compensation for his losses. Even standard forms of contracts have provision for contractor’s claim. Therefore it should not be demonised.

Dealing with claims:

Compromising over claims and having holistic view are both inline with maintaining flexibility in the projects, which is referred to in complexity chapter. Some of the interviews gave example of such flexibilities in their projects. The case studies also show to such attitudes.
8.3. DISPUTE SUMMARY

8.3.1. Introduction

Documents and their analysis like other methods can be used as complementary strategy to methods such as interviews or it can be used as a standalone method.

According to Scott (1990) there are four criteria for assessing the quality of documents which are used as data in a research:

1. Authenticity. Is the evidence genuine and of unquestionable origin?
2. Credibility. Is the evidence free from error?
3. Representativeness. Is the evidence typical of its type?
4. Meaning. Is the evidence clear and comprehensible?

Flick (2009) suggests that if you are going to use a certain document as a source of data in your research you should ask yourself: who has produced this document and for what purpose? By producing documents organisations try to document organisational routines and record information to legitimise who things are done in such routines. He strongly recommends researchers to avoid focusing on contents of documents without taking their contexts, uses and functions into account.

8.3.2. About the documents

Due to some understandable concerns, getting access to details of conflicts in national oil, gas and petrochemical projects is not possible. However a recently established mediation office in the ministry of oil has prepared a report on the cases of dispute in recent project which have been referred to them. The report is used to
draw a picture of types and frequency claims in the Iranian oil, gas and petrochemical projects. Unfortunately the researcher could not get access to more details on these cases; a detail study of cases like these can be a further work as it is mentioned in chapter 9.

According to Iranian law the dispute in government project must be resolved in the courts. Article 139 of the Iranian constitution maintains:

“The settlement, of claims relating to public and state property or the referral thereof to arbitration is in every case dependent on the approval of the Cabinet of the Ministers and the Parliament must be informed of these matters. In cases where one party to the dispute is a foreigner, as well as in important cases that are purely domestic the approval of the assembly must also be obtained. Law will specify the important cases intended here.”

ADR has been introduced to Iranian projects by international projects they usually have a clause that maintains:

“If any dispute or difference of any kind shall arise between the owner and the contractor in connection with or arising out of the work (whether during the execution of the work or after their completion whether before or after termination, abandonment or breach of the contract) and is not resolved through negotiation. It shall be discussed and reviewed by committee consisting of the high ranking management of the Owner and the Contractor. This committee shall endeavour to resolve the dispute within 30 days. Should the committee not be able to resolve the dispute to the satisfaction of the parties, the case shall be referred to arbitration to ICC either in Switzerland or Paris at Owners sole discretion. Arbitration shall be conducted

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by 3 arbitrators to be appointed in accordance with the ICC rules. However the governing law of the arbitration shall be the laws of Islamic Republic of Iran. The language to be used in arbitration shall be the English language.”

After the boom of international joint venture projects 1995-2005 a mediation office established in the ministry of oil to help government clients and private contractors to resolve their disputes. Table 8.5 and 8.6 show summary of the cases which were referred to this office.

Total value of the contracts exceeds 700 million USD, and they have been performed from 1994 to 2006 in the Iranian oil, gas and petrochemical sector. For the purpose of this research the projects have been divided into two groups construction projects and EPC- turn key contracts.

6 construction projects and 10 EPC (turnkey) projects have been studied. The complete tables are attached to this report and summary of them are as follows:

Table 8.5 Claims in 6 construction projects

<table>
<thead>
<tr>
<th>Construction Projects (6 Projects)</th>
<th>Type</th>
<th>Frequency</th>
<th>Average per project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Site overheads</td>
<td>11</td>
<td>1.83</td>
</tr>
<tr>
<td></td>
<td>Changes in Work</td>
<td>17</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>Financial issues</td>
<td>16</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>Delay, interference, hindrance by client</td>
<td>5</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>Unaccomplished duties</td>
<td>4</td>
<td>0.66</td>
</tr>
</tbody>
</table>
### Table 8.6 Claims in 10 EPC Projects

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Average per project</th>
<th>Change%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Overheads</td>
<td>7</td>
<td>0.7</td>
<td>-63%</td>
</tr>
<tr>
<td>Change in Work</td>
<td>16</td>
<td>1.6</td>
<td>-44%</td>
</tr>
<tr>
<td>Financial Issues</td>
<td>31</td>
<td>3.1</td>
<td>16%</td>
</tr>
<tr>
<td>Delay, interference, hindrance by client</td>
<td>2</td>
<td>0.2</td>
<td>-76%</td>
</tr>
<tr>
<td>Others</td>
<td>7</td>
<td>0.7</td>
<td>N/A</td>
</tr>
</tbody>
</table>

As it can seen by switching from ‘EP+C’ to ‘EPC- turnkey’ procurement route frequency of all types of claim per project reduced except financial claims. The reason is clear, as in EPC (turnkey) projects are responsibilities are transferred to the contractor and there is much less boundaries between client and contractors scope of work and there for much less area for disputes and claims. However the equal number of financial claims indicates the significance of financial claims in the projects and corroborates the outcomes of detail interviews.

As it has been shown in detailed tables financial claims consist of:

- Delay in payment by client.
- Demanding interest on overdue payments.
- Returning retention payments and guarantees
- Change in foreign exchange parity
- Demanding price adjustment due to abrupt increase in price of raw material

### 8.3.3. Summary
As the case studies showed financial claims usually make the biggest part of claims.

Site overhead claims are another common type of claims, however they are caused by so many different reasons that one can hardly formulate a tool for avoiding (or reducing) them. Overhead claims vary from social security payments, to camp and canteen expenses to demanding money for plants which have been rented to other contractor’s at site.

Change related claims are another frequent type of claim in these projects. Changes are inevitable in major projects and all standard forms of contracts include a section on change orders. However it has been seen that sometimes parties to contract do not follow change procedures mentioned in the contract, make verbal agreement, fail to keep records of the work and postpone resolution of the issue to the end of project. As time passes people who was involved in making the agreement may leave the project and lack of proper record keeping will be even a bigger problem.

Another problem regarding change orders is that client does not see any contingency fund to cover the costs associated with changes during the course of the project.
8.4. The Questionnaire Survey

8.4.1. Introduction
In order to verify finding of the interviews and other qualitative methods a questionnaire survey has been performed. The survey was web based and distributed among Iranian practitioners who are involved in major oil, gas and petrochemical projects.

8.4.2. Structure of the Questionnaire

The questionnaire is consisted of three sections:

1. Information about the respondents for taxonomy purpose.
2. Questions on causes of claim
3. Questions on peoples attitude and perception toward the issue of claim
4. Questions on claim prevention measure

Each of these sections is explained below.

1. Taxonomy

In this section questions are asked about

- Type of the project
- Project value
- Method of payment
• Procurement route
• Location of the project
• Interviewees organisation role in the project
• Interviewee’s position
• Interviewee’s experience

2. Claim Probability/Consequence Matrix

Consequence/probability matrix is one of the easiest and most common methods for assessment of the risks. It combines qualitative or semi quantitative rating of probability and consequence to produce a level of risk rating. This method is explained in detail in many documents such as British Standard on ‘Risk Assessment Techniques’ (BS EN 31010: 2010) or ‘Risk Management Guide for DoD Acquisition’ (The US Department of Defence, 2006). Consequence/probability matrix is widely used in hazard and operability (HAZOP) studies in engineering projects. In brief the method is based on asking expert people who are involved in a process to assess probability of an event and its impact of different risks in the scale of 1 to 5, then the average of estimated values are calculated and a single square is allocated to each of risks on a matrix drawn with consequence on one axis and probability on other axis. Figure 8.2 shows an example of probability/consequence matrix.
From long list of possible claims and their causes which often mix together in the literature the following type of claims which have been foreseen in the FIDC forms of contract have been chosen:

- Delay claim
- Cost overrun claim
- Delay in payments or non-payments
- Change related Claims
- Material related claims
- Claims due to negligence and quality of work

Respondents were requested to assess probability of materialising each type of claim in their projects in the scale of 1 to 5 by selecting one of these choices:

1. Frequently
2. Very often
3. Sometimes
4. Seldom
5. Never

They also asked to assess the impact of each type of claim on project performance in the scale of 1 to 5 by selecting one of these choices:

1. Very severe impact
2. Quite severe impact
3. Somewhat severe impact
4. Slight impact
5. No impact

3. Practitioner’s attitude and perception toward claim

The respondents have been asked if they see the claim issue as a challenge in the construction of major. The idea was to understand if the academics and practitioners both have a same perception of claim.

To understand people attitude toward claims they have been asked if they ever referred a claim to court, and why. As previous study by the author shows that rate of litigation are very low in the Iranian construction industry (Naimi, 2008). It was intended to confirm that finding again. The next question was asked about reason of practitioner’s hesitation in referring their cases to the court.

4. Potential measure for avoiding claims

A list of potential measures that can be used for avoiding (or reducing) claims in the projects has been prepared. The list was outcome of a series of interviews with practitioners about problems of Iranian construction industry. Table 8.7 shows these measures.
Table 8.7 Measures for avoiding (or reducing) claims in the projects

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Factor</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improving accuracy and quality of tender documents</td>
<td>Contracting</td>
</tr>
<tr>
<td>2</td>
<td>Preparing detail Contract</td>
<td>Contracting</td>
</tr>
<tr>
<td>3</td>
<td>Systematic Record Keeping</td>
<td>Management</td>
</tr>
<tr>
<td>4</td>
<td>Effective communication between project stakeholders</td>
<td>Management</td>
</tr>
<tr>
<td>5</td>
<td>Identification and Control of Uncertainties</td>
<td>Management</td>
</tr>
<tr>
<td>6</td>
<td>Improving bidding procedures</td>
<td>Contracting</td>
</tr>
<tr>
<td>7</td>
<td>Expectation of work from the same client in the future</td>
<td>Market</td>
</tr>
<tr>
<td>8</td>
<td>Partnering arrangements</td>
<td>Contracting</td>
</tr>
<tr>
<td>9</td>
<td>Using Alternative Dispute Resolution (ADR)</td>
<td>Management</td>
</tr>
<tr>
<td>10</td>
<td>Drafting balance Contracts</td>
<td>Contracting</td>
</tr>
<tr>
<td>11</td>
<td>Professional Ethics</td>
<td>Management</td>
</tr>
<tr>
<td>12</td>
<td>Inclusion of Escalation Clause in Contract</td>
<td>Financial</td>
</tr>
<tr>
<td>13</td>
<td>Having history of work in previous projects with the same client or contractor</td>
<td>Marketing</td>
</tr>
<tr>
<td>14</td>
<td>Legal awareness of project management team</td>
<td>Management</td>
</tr>
<tr>
<td>15</td>
<td>Using project bank account</td>
<td>Financial</td>
</tr>
<tr>
<td>16</td>
<td>Adopting comprehensive insurance policy</td>
<td>Financial</td>
</tr>
<tr>
<td>17</td>
<td>Interest</td>
<td>Financial</td>
</tr>
<tr>
<td>18</td>
<td>Non contractual Measures</td>
<td>Management</td>
</tr>
<tr>
<td>19</td>
<td>Using standard forms of contract such as FIDIC or NEC3</td>
<td>Contracting</td>
</tr>
</tbody>
</table>

The respondents have been asked to assess the efficiency of each of the measures listed in table 8.7 in avoiding claims based on their experience in the scale of 1 to 5 by selecting one of these choices.

- Very effective
- Effective
• Neutral
• Ineffective
• Very ineffective

This assessment can then be quantified and used for calculation of Relative Importance Index (RII).

Relative Importance Index Method

\[
RII = \frac{\sum_{i=1}^{n} W_i}{A \times N}
\]

W is the eight given to each factor by respondent
A is the highest weight
N is the total number of respondents

The RII value varies from 0 to 1, the higher the number the more effective the factor according to the respondents. The technique is widely used in different fields from construction management (for instance see Kometa et al., 1994; Sambasivan and Soon, 2007) to biology and medical sciences.

There are considerable body of literatures on positive outcomes of disputes such as organisational learning, motivation, innovation, etc. The interviews both in Iran and in the UK also showed that some practitioners enter the project with intention for claim, and use claim as a business strategy. Therefore in the last question the respondents have been asked if they see any positive outcome from disputes and claims, and what those positive outcomes are.
8.4.4. The Results of the Questionnaire

The questionnaire have been sent to 170 people however after two reminders only 25 completed responds have been received. That means the rate of return was 14.7%. This rate of return may be acceptable for a web based survey (generally between 10 to 20 percent) however given the fact the questionnaire was distributed in organisations which the authored had previously worked with them; a higher rate of return was expected.

Due to low number of responds correlation analysis might not be meaningful, therefore only descriptive analysis was performed and the findings are as follow.

The risk matrix prepared based on results of the questionnaire shows that main risks of claim in Iranian projects in order of importance are:

<table>
<thead>
<tr>
<th>Type of Claim</th>
<th>Overall Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Delay in completion</td>
<td>18.42</td>
</tr>
<tr>
<td>2  Cost overrun</td>
<td>16.67</td>
</tr>
<tr>
<td>3  Delay in payment (or non-payment)</td>
<td>15.44</td>
</tr>
<tr>
<td>4  Change in Work</td>
<td>14.48</td>
</tr>
<tr>
<td>5  Negligence and quality related claims</td>
<td>11.07</td>
</tr>
<tr>
<td>6  Material related claims</td>
<td>9.5</td>
</tr>
</tbody>
</table>

As table 8.8 shows, ‘delay in payment’ is in the third position and higher than ‘change in work’. The interviews, case studies and claim cases which had been referred to the aforementioned mediation office also show the significant role of financial issues in the formation of claims.
Table 8.9 shows claim avoiding measure in the order of affectivity based on respondents’ answers.

**Table 8.9 Claim avoidance measure in order of their effectiveness according to questionnaire survey**

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Factor</th>
<th>RII</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improving accuracy and quality of tender documents</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>Preparing detail Contract</td>
<td>0.68</td>
</tr>
<tr>
<td>3</td>
<td>Systematic Record Keeping</td>
<td>0.67</td>
</tr>
<tr>
<td>4</td>
<td>Expectation of work from the same client in the future</td>
<td>0.62</td>
</tr>
<tr>
<td>5</td>
<td>Identification and Control of Uncertainties</td>
<td>0.61</td>
</tr>
<tr>
<td>6</td>
<td>Improving bidding procedures</td>
<td>0.61</td>
</tr>
<tr>
<td>7</td>
<td>Effective communication between project stakeholders</td>
<td>0.59</td>
</tr>
<tr>
<td>8</td>
<td>Drafting Balance Contracts</td>
<td>0.55</td>
</tr>
<tr>
<td>9</td>
<td>Inclusion of Escalation Clause in Contract</td>
<td>0.53</td>
</tr>
<tr>
<td>10</td>
<td>Using Alternative Dispute Resolution (ADR)</td>
<td>0.53</td>
</tr>
<tr>
<td>11</td>
<td>Partnering arrangements</td>
<td>0.48</td>
</tr>
<tr>
<td>12</td>
<td>Using project bank account</td>
<td>0.48</td>
</tr>
<tr>
<td>13</td>
<td>Professional Ethics</td>
<td>0.48</td>
</tr>
<tr>
<td>14</td>
<td>Interest</td>
<td>0.44</td>
</tr>
<tr>
<td>15</td>
<td>Legal awareness of project management team</td>
<td>0.43</td>
</tr>
<tr>
<td>16</td>
<td>History of Work Having history of work in previous projects with the same client or contractor</td>
<td>0.38</td>
</tr>
<tr>
<td>17</td>
<td>Non contractual Measures</td>
<td>0.29</td>
</tr>
<tr>
<td>18</td>
<td>Adopting comprehensive insurance policy</td>
<td>0.26</td>
</tr>
<tr>
<td>19</td>
<td>Using standard forms of contract such as FIDIC or NEC3</td>
<td>0.24</td>
</tr>
</tbody>
</table>
Though the RII values are relatively close the coloured items in table 3 are outside the *Med ± standard deviation* range. It is remarkable that the three most efficient ranked measures all are related to formal (classical) governing and contract administration. However none of the respondents has ever been involved in litigation.

This outcome may seem in contradiction with the results of interviews and case studies which show in practice contract does not play much role in resolution of disputes; however it shows that problem in tender documents and contract can lead to formation of a dispute, and poor record keeping help in escalation of dispute to claim.

%75 of the respondents believes that claim is a major problem in their projects, however %91 of them have never referred a case to court. This is inline with the results of the interviews.

The respondents explain their reluctance to litigation by referring to the following points:

<table>
<thead>
<tr>
<th>Table 8.10 Reasons for nor referring disputes to courts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Length of litigation</td>
</tr>
<tr>
<td>Cost of litigation</td>
</tr>
<tr>
<td>Inefficiency of legal system</td>
</tr>
<tr>
<td>To avoid bad reputation</td>
</tr>
</tbody>
</table>

%62 of the respondents believe that claim can have positive outcome. While %20 of them see claim or conflict as a tool for organisational learning and quality improvement, the rest see it as an instrument for enforcing contract and safeguarding their interest.
The World Bank annually prepares a series of reports on each individual country titled “Doing Business in [name of country]”. In these reports 10 stages of business life which are starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contract and closing business are studied and compared in different countries.

“Doing Business in Iran – 2010” shows that the country is ranked 138 out of 183 countries in ease of doing business Figure 8.3 compare the ease of business in Iran with that in some other countries in the region.

![Ease of Doing Business - Global Rank](image)

**Figure 8.3** Comparison of “ease of business” in selected economies. Source: Doing Business in IRAN (Source: The World Bank, 2010)

From all measured factors this research is interested in “contract enforcing”. This factor is investigated by measuring these parameters:

1. Number of procedures which are defined as interaction between the parties or between them and the judge or court officer.

2. Time which counts the number of calendar days from the moment the seller files the law suit in court until payment is received.
3. Cost, which is recorded as a percentage of the claim.

The World Bank’s survey ranked Iran in the 53th place among 183 countries and considerably higher than other Middle East and North Africa countries. Figure 8.4 compare enforcing contracts in Iran and other countries in the Middle East.

![Enforcing Contracts - Global Rank](image)

**Figure 8.4** Ranking of IRAN in enforcing contracts compared to good practice and selected economies. Source: Doing Business in IRAN (Source: The World Bank, 2010)

Figure 8.5 also compares the tree indicators of “enforcing contracts” in Iran with average of Middle East and North Africa countries.

In 2011 report the World Bank ranks Iran in the 50th place in contract enforceability ranking, while position of some other countries in this ranking is listed in table 8.11.

These report show that despite what interviewees and respondents believe, the Iranian legal system is not that inefficient. Though it is not in the best condition, it is far more efficient than the other countries in the region.

It can be conclude that the perception of inefficiency of legal system and feeling uneasy to go to court has roots in the national culture rather than realities of the legal system.
Figure 8.5 Enforcing contract indicators in Iran and Middle East during the past three years. Source: Doing Business in IRAN (The World Bank, 2010)

Table 8.11 Some countries ranked by their contract enforceability (Source: Doing Business in a more transparent world, The International Bank for reconstruction and development (The World Bank, 2012)

<table>
<thead>
<tr>
<th>Country</th>
<th>Enforcing Contracts (Rank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburg</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>6</td>
</tr>
<tr>
<td>France</td>
<td>7</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>21</td>
</tr>
<tr>
<td>Sweden</td>
<td>54</td>
</tr>
<tr>
<td>Spain</td>
<td>54</td>
</tr>
<tr>
<td>Greece</td>
<td>91</td>
</tr>
<tr>
<td>Qatar</td>
<td>95</td>
</tr>
<tr>
<td>Brazil</td>
<td>118</td>
</tr>
<tr>
<td>Pakistan</td>
<td>154</td>
</tr>
<tr>
<td>Italy</td>
<td>158</td>
</tr>
<tr>
<td>Angola</td>
<td>181</td>
</tr>
<tr>
<td>India</td>
<td>182</td>
</tr>
</tbody>
</table>
8.4.5. Summary
The questionnaire survey was intended to triangulate and verify practitioners’ perception about claim and measures for prevention of claims. Due to low number of respondents, only descriptive analysis is performed.

This survey identified the risk of claim in projects in order of importance as:

1. Delay in completion
2. Cost overrun
3. Delay in payment or non-payment
4. Change in work
5. Negligence and quality related issues
6. Material related issues

The position of ‘delay in payment’ in the third place is remarkable, following mediation cases (section 8.3) and interviews (section8.2)

A list of measures for avoiding disputes has been prepared based on interviews and literature. Using the five point Likert scale, the respondents were requested to assess the effectiveness of each of the measures. Subsequently Relative Importance Factor (RII) has been calculated.

It is remarkable that the three most efficient ranked measures all are related to formal governing and contract administration.

The survey also showed that 85% of the respondents consider disputes and claims as one the main problems in the construction industry; however 91% of them have never experienced litigation. When they have been asked about their reason for avoiding litigation they mentioned that from their point of view the legal system is not efficient enough. On the contrary the World Bank’s annual “Doing Business” reports indicate that contract enforceability is relatively high in Iran.

The difference between respondents’ perception and the realities can be explained by the Iranian business culture which is discussed in chapter seven.
CHAPTER NINE – DISCUSSION

9.1. Introduction
In this research data presentation is mixed with discussion however in order to keep integrity and logical continuity of the chapters a summary of what mentioned before throughout the thesis is presented in this chapter and before conclusion. This chapter reviews and summarise what mentioned before on the role of contract in preventing claim in the projects.

9.2. On the Role of Contract
Anticipating the possibility of opportunistic behaviour and conflict, firms usually rely on interfirm governance mechanism to mitigate relationship risks and facilitate cooperation (Lumineau and Malhorta, 2011). Contractual arrangements are one the mechanisms which establish such governance (Williamson, 1985). Contracts by defining rights and responsibilities help parties to constrain attempts to exploitation (Brown et al., 2000).

According to Lumineau and Malhorta (2011) contract affects behaviours of people involved in project not only directly by defining appropriate behaviour, but also indirectly by shaping expectations and beliefs. Similarly, March (1994) maintains that contract provides the lens through which firms evaluate each other’s behaviour, and the appropriateness of their own responses. Therefore contract can have an influential role in formation of dispute in projects.

In this research three theories about contracting have been reviewed. Though they have originated from different disciplines they all agree on the fact that the contract by itself is not sufficient for regulating the relations between the parties and avoid conflicts. This can be a form of theoretical triangulation of insufficiency of contract in preventing claim in projects (See section 5.9).

1. Transaction cost economics
The theory of transaction cost economics maintains that there is nothing such as complete contract. No matter how well a contract is drafted there is always room for conflict in interpretations of clauses and opportunistic behaviour by the parties. In order to prevent such ex-ante and ex-post opportunistic behaviour enormous amount of transaction cost will be imposed to parties of contract, which is generally unacceptable (Williamson, 1996 and Grossman and Hart, 1986).

2. Principal-agent theory

The principal–agent problem or agency dilemma concerns conditions of incomplete and asymmetric information when a principal hires an agent. Under such circumstances two problems may arise: potential moral hazard and conflict of interest (Eisenhardt, 1989; Turner, 2005 and Winch, 2010).

3. Relational contracting

Relational contract maintains that in practice when parties to contract believe that their counterparts are necessary for their business, they prefer to negotiate and rearrange their relations in order to keep the continuity of their relation rather than using a rigid contract (MacNeil, 1974 and 200, Austem Baker, 2008).

9.3. Engineering, Procurement and Construction (EPC) Contracts

Procurement strategy and contractual arrangements are often made by clients so that protect their interests in the best way. Many client organisations especially in public sector have tendency toward fixed price and EPC (turn key) projects as they believe in an uncertain environment these types of contracts can protect their interest in the best way transferring all project risks and uncertainties to contractors. In the public sector fixed price contract are very popular due to their high level of clarity and accountability (Rowlinson, 1999; Love et al., 2008 and Cohen and Eimicke, 2008).

By formation of National oil companies (NOCs) in the oil producing countries, formation of Organization of the Petroleum Exporting Countries (OPEC) and increase in the price of crude oil and its products NOCs are able to finance their projects themselves and market of oil and gas projects are mainly supply dominated. Under
such circumstances clients can impose their conditions to contractors. The procurement route of choice for the majority of the clients is EPC-turnkey as it provides them with certainty and clarity at the same time. Until recently the contractors were also interested in this method of procurement as they could put price and on the risks they take at bidding stage and make profit with effective management of the risks.

9.4. Standard Forms of Contract
Within each procurement category different standard forms of contract have been developed over the years. These standard forms have tried to implement provisions to cover the thorny issues which have been identified as the main causes of disputes and claims based on the accumulated experience over years. Nevertheless they were not so successful in fulfilling this aim. There are even some reports which indicate that the number of confrontations between clients and contractors have been increased during the past decades.

9.5. Discussion on Heathrow Terminal Five Project
During the past decades partnering has been introduced as a procurement route that can overcome adversarial attitudes in the construction industries and prevent claims. There are considerable body of literature on effectiveness of partnering arrangements in. Since the completion of the Heathrow Terminal five (T5) this project is often introduced as an example for success of such arrangements in preventing claims in mega projects.

This research looks at T5 as an example of major construction project which has not experienced any dispute and investigate the innovative “T5 agreement” which has been referred to as the heart of the project to identify some characteristics of this procurement model which can be used in other major projects for preventing claims.

This study showed that this particular arrangement imposed a very high administrative cost to the client. According to Williamson, such a governance structure is only efficient when the risk of project is high and the client has frequent transactions with the same contractors. Both conditions were valid for this particular
project. The risk of project was vital for British Airports Authority (BAA) and the first tier contractors had a long history of working in the BAA’s projects.

The general conclusion of this case study is that although T5 agreement worked perfectly well for this particular project, it cannot be prescribed for all construction projects. Moreover it doesn’t prove that similar partnering arrangements in other major project can lead to similar outcomes.

**9.6. Complexity**

Project management can be aided by taking projects as systems (Remington and Pollack, 2010 and Vidal and Marle, 2008). The complexity science set a new holistic paradigm which maintains that the parts of a system can only be understood in terms of their relationships with each other and with the whole system. In the other words, it is the pattern of the relationships which determines function of a system (Jackson, 2003).

In the management context, complexity theory suggests that due to presence of numerous non-linear feedback loops and sensitivity to the initial setting of the system (i.e. project or organisation), long term planning long term planning is impossible. Jackson (2003) maintains that long term planning, rigid structures, precise task definitions and elaborate rules that accompany them (which all are parts of the contract) are detrimental to the system as they can fix an organisation in perusing a particular vision while the uncertain environment requires flexible responses.

Unlike the traditional views which consider conflict as a noise or pathogen in the project system, from complexity view conflicts are viewed as fluctuation in the ongoing interactions of system elements. This fluctuation is a natural deviation existing patterns, and is neither good nor bad by itself, but it requires accommodation or readjustment. From a complexity perspective conflict in a system is normal, necessary and continues. Moreover any effort to predict or prevent conflicts is doomed as conflict is nothing but the fluctuation in the ongoing interactions of system agents (Andrade et al. 2008).
Projects as complex systems are unpredictable and rigid contracts can damage the system as its requirements may vary during the project execution. Instead of conflict prevention, establishment of early warning systems that can alert the parties to contract of the conflict and let them rearrange their relationships seems more efficient. Cybernetics calls it an error controlled regulator.

This does not diminish the role of contract, because the contract forms the initial setting of the system (project) and complex systems are extremely sensible to their initial setting. As it is discussed in chapters three and eight, similar recommendations have been made for flexibility in contracts, warning systems and communications in others area of project managements.

In complex projects contract incompleteness is higher than simple projects (Bajari et al. 2006) and therefore ex-post adjustment of the original contract is much more likely in them (Warra, 2007). Necessity of these modifications in contracts is reflected in the works of many scholars. They look at the subject from different perspectives and recommend different measures for tackling the problem including:

- Effective communication (PMI, 2004)
- Error controlled regulators (Cybernetic scholars such as Ashby, 1956 and Ramaprasad, 1983, Stacy, 2006)
- Flexibility in contract (Bettis and Hitt, 1995; Shenhar, 2001; Floricel and Miller, 2001; Branconi and Loch, 2004 and Ariely, 2011).
- Fairness and early warning system (Kim and Mauborgne, 1997)
- Open ended contract (Loch et al., 2006)

From the dispute point of view all these solutions are valid and their share a common essence. This is in line with the readjustment concept in complex systems when fluctuations happen in ongoing relationships between the members of a complex system (See chapter four).

9.7. The Role of Culture
As the data have been obtained from Iranian projects its logical to believe that national culture has influenced people’s behaviour. After all culture by definition is the way a group of people solve their problems (Swindler,1986 and Trompenaars,
1997) and construction claim is one the most important problem in the construction industry. According to the literature (among others Schramm- Nielsen and Faradonbeh, 2002; Hofstede, 2001; Nahavandi, 2009 and Katouzian, 2009) some of the main features of Iranian culture are:

- High collectivism
- Femininity
- Paternalism
- Short term society

The first three characteristics can encourage non-adversarial behaviour in projects while the fourth one in project context can cause frequent change in key personnel and cause dispute.
CHAPTER TEN - CONCLUSION

10.1. Introduction
In this chapter the main findings of the research is reviewed and then the relationship between the research aim, measurable objectives, research questions and the activities performed throughout the research are examined. Following that the limitations and contributions of the research are explained and and suggestion for further researches are made.

10.2. Literature Review
The literature review shows that no contract by itself can guarantee that claims and dispute will not happen in project; no matter how detail it is drafted. Transaction cost economics, relational contracting and principal-agent theory though routed in different areas support this idea.

In the past century and especially after the World War II many attempts have been made to draft complete contracts and innovative procurement strategies to prevent (or reduce) claims in the construction industries. However the result was less than satisfactory and today construction claims are one of the major problems of the industries all over the world.

This research shows how some of the most rigid contracts which transfer all the risks to the contractors cannot protect the client’s interest and how clients are the ultimate risk bearer of projects.

10.3. Field Works
In this research different sources of information have been used to obtain an inner picture of claim and disputes in major Iranian oil and gas projects which shows the problems which usually arise, their main causes and people perception regarding them.
Four stages of data gathering occur:

1. Case studies
2. Interviews
3. Analysis of available documents
4. Questionnaire survey

10.3.1. Case Studies
Two case studies from Iranian petrochemical projects were carried out. These cases show the common types of claim, their causes and their value comparing to total value of claim in Iranian oil and gas projects. They also support the idea that:

- Contract has an important role in formation of dispute but not in resolving it.
- The financial issues have formed the main part of the claims.
- The contractor has a high bargaining power after commencement of work and before completion of the project. This is very much due to the fact that client’s investment is locked up and cost of removing contractor and hiring a substitute contractor to complete the project is generally too high to be acceptable by client. This is a classic example of what transaction cost economics refers to as “asset specificity”.
- Contract doesn’t play an influential role in resolving disputes when the parties’ relation is on the brink of collapse. The cases show that under such circumstances client and contractor prefer to solve their dispute without addressing the contract and on a give and take basis. It can be said that contract plays the role of guide lines for bargaining and negotiations rather than a concrete basis for it. This is exactly the situation which McNeil (2000) and Macaulay (1963) among other relational contracting scholars described in their works.
- As it has been shown, the client’s loss from accepting the contractor’s claim (even if they are not fair) is not considerable compared to the revenue that can be generated should the project be completed earlier. Both client and
contractor are aware of this fact and that can affect their strategy in conflict resolution negotiations.

To understand the chain of events in the Iranian construction projects, attention must be made to the Iranian business culture. As discussed in chapter seven, some of the main features of the Iranian culture which have been reflected in the literature are:

- High power distance
- Collectivism
- Short-term society
- Particularism
- Paternalism

These cultural elements combined with socio-economical environment of the projects such as government dominance over the economy, lack of experience among some of clients’ project managers, contractor’s dependency to government for upcoming projects make a peculiar environment in which negotiation and other sorts of non contentious problem solving is encouraged.

10.3.2. Interviews

A series of grounded theory like interviews have been adopted to understand the practitioners’ perception of claim issue in the oil and gas projects. The main findings of these interviews are as follows:

**Before contract:**

- **Unrealistic assumptions in tendering and contracting stage.** Clients often have optimisation bias toward project, and therefore their estimation for both time and duration of the projects are unrealistic. These unrealistic assumptions can cause dispute between project stakeholders.
- **Incompleteness of basic engineering package.** It is general practice in major construction projects that conceptual design and basic engineering package are completed before tendering for detailed engineering and construction. In
most of the cases basic engineering package is used as tender documents. In completeness and discrepancy between different elements of basic engineering package imposes extra work to contractor and inserts error in estimates.

Contracting:

- **Unfair contractual clauses.** Most of the unfair contractual clauses try to remove client’s liability in contract and in tort. Though client’s intention is reducing his liabilities and overall cost of the project, disclaimer clauses can cause disputes and increase the overall cost of projects in the construction industry.

- **Ambiguity in contracts.** Unclear tender documents can lead to vague contracts which have very high potential for disputes and claims. Scope of work, split of responsibilities between client and contractors, change order procedures, documents and materials which need clients’ approval and limits of client’s authority terms of approval or commenting on documents.

- **Detail contracting Vs. Non contractual factors.** The required level of detail in contracts is a controversial issue. Some interviewees believe that contract must be as detailed as possible, whereas others believe that too much details causes hindrance and limit project managers’ choices in problem solving.

- **Lump-sum contracts (Risk).** Interviewees have mentioned that lump-sum forms of contract are not suitable for complex projects with high level of uncertainties.

- **Relational contracts and lack of accountability.** Despite all the literature about efficiency of relational contracts, partnering and long term relations as measures for reducing construction claims, interviewees from both client and contractors groups believe that such methods are not applicable to major public projects, as they decrease the accountability and clarity of transactions.

**After contract:**
• **Claim as contractors’ right.** Contractors have concerns about demonising of claim in construction industry. They believe that claim is currently a taboo in the public infrastructure projects and it should be seen as contractor’s legal right for compensation of his losses in the project.

• **Problems with payment.** Interviewees have experienced delay in payments and considered it as a major cause of contractors’ claim. They believe that problem is far less in international projects which use letter of credit (LC). The use of project bank account can help in solving this problem in the projects.

• **Compromising over claims.** It is also understood that as a general practice clients trade off contractor’s claims for extra payment with their own counter claim for delay in completion. This attitude beside other factors is one of the reasons for low number of cases which are referred to the court. Though contractors are not satisfied with this approach they accept it as they either believe that government clients are too strong to engage in litigation with or the judicial system is not efficient enough in construction and technical cases.

• **Personalities.**
  Personality plays an important role in our individual way of responding, acting and communicating when facing conflict. People with different types of personalities have different needs which if unfulfilled can cause frustration, initiate a conflict or escalate an already existed conflict.

The interviews identified some of the main causes of claim in major construction projects based on Iranian practitioners’ perceptions. More over a series of practical measures for reducing (if not preventing of) these claims have been presented.

10.3.3. Review of Claim Cases
In the next stage claim cases which had been arisen in oil, gas and petrochemical sectors and referred to a mediation office have been reviewed and categorised. These cases have been divided into “construction projects” and “EPC- turnkey project” as it’s shown in Table 8.5 and Table 8.6.

In EPC –turnkey projects average number of claims per project has been reduced in all types of claims except financial ones. Financial claims consist of:
1. Delay in payment or non-payment by client
2. Demanding interest on overdue payments
3. Returning retention payment and guarantee
4. Change in foreign exchange parity
5. Demanding price adjustment

The case studies also showed that financial claims make up main part of the claim in major construction projects. This evidence along with weight of financial issues in total claim is shown in the case studies illustrate the importance of financial disputes in construction claims. Ensuring availability of project fund before the commencement of the project and attention to making payment to contractors in due course can reduce both the number of and the amount of claims in large-scale construction projects.

10.3.4. Questionnaire Survey
To triangulate and verify the findings, a questionnaire survey has been performed. This survey showed that the respondents identified main causes of claims in order of importance as:

1. Delay in completion
2. Cost overrun
3. Delay in payment or non-payment
4. Change in work
5. Negligence and quality related issues
6. Material related issues

The previous studies almost invariably reported the first two items as major causes of claim however the role of delay in payment have been rarely reported and it can be one of the characteristics of the major Iranian projects.
A list of measures for avoiding disputes has been prepared based on detail interviews and literature. Using the five point Likert scale, the respondents have been requested to specify how effective each of the measures is. Subsequently Relative Importance Factor (RII) has been calculated and the dispute avoiding techniques has been ranked in order of efficiency as follows:

Table 10.1 The most efficient and most inefficient claim control measures based on the results of the questionnaire survey

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>RII</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accurate Tender Documents</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>Detail Contracts</td>
<td>0.68</td>
</tr>
<tr>
<td>3</td>
<td>Systematic Record Keeping</td>
<td>0.67</td>
</tr>
<tr>
<td>17</td>
<td>Non contractual Measures</td>
<td>0.29</td>
</tr>
<tr>
<td>18</td>
<td>Insurance</td>
<td>0.26</td>
</tr>
<tr>
<td>19</td>
<td>Using standard forms such as FIDIC and NEC3</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Though the RII values are relatively close, the factors which are listed in table 10.1 are outside the $\text{Med} \pm \text{standard deviation}$ range. It is remarkable that the three most efficient ranked measures all are related to formal (classical) governing and contract administration. It may seem that project managers stress on contractual related issues is in contradiction with the theories which are reviewed in chapter three and maintain that contract cannot avoid claim in project by itself no matter how well drafted the contract. However it should be noted that though no contract is perfect (among others Williamson and MacNeil) inaccurate document and vague contracts definitely cause claim especially in EPC-turnkey contact that contractor has to foresee every aspect of project and put a price on it before the commencement of project during the bidding stage.

Moreover the survey showed 85% of the respondents consider disputes and claims as one the main problems in the construction industry, however 91% of them had
never experienced litigation. When they have been asked about their reason for avoiding litigation they mentioned that from their point of view the legal system is not efficient enough. On the contrary the World Bank’s annual “Doing Business” report of 2011 indicates that contract enforceability is relatively high in Iran.

The difference between respondents’ perception and the realities can be explained by some of the Iranian cultural dimensions which are discussed in chapter seven.

Generally uncertainty is high in all construction projects. In large-scale projects due to reasons such as long duration of the projects, high number of organisation that are involved, technical complexities and multiple interfaces the level of uncertainty is higher than small projects. In the Iranian projects due to socio-economical conditions of the construction industry the level of uncertainty is even higher. To cope with this level of uncertainty, a high degree of flexibility is required.

Though contract by itself cannot ensure that no dispute will arise between client and contractor, the study showed that proper addressing of following issues can reduce the possibility:

- Including escalation clause in contract
- Using project Bank account
- Improving tender documents and tendering procedures
- Limited liability of contractor

10.4. Review of Research Questions

In this research definitions of claims and disputes in general and in construction and types of them are provided, the relationship between claim and contract is investigated, and finally claims and claim management in the Iranian oil and gas project, their main causes and people’s perception of them are studied.

The research answered the research questions as follows:

Q1. What is the nature of claim, dispute and conflict?
Various definitions of conflict, dispute and claims are presented and the relationship between them is discussed. Scholars often put dispute and claim on different points on the dispute escalation continuum, therefore these terms are sometimes used interchangeably in the literature.

There are two main views on conflict in the literature:

The first view considers conflict as a bug in system or a pathogen that causes noise and should be reduced if not avoided at all to enhance the smooth function of the system.

The second view considers conflict and dispute as the driving force for development and growth of system. Historically Hegelian dialectic maintains conflicts lead to evolution and in the recent years complexity science considers conflicts in complex systems natural and any attempt for preventing them doomed. Chapters two and four discussed these issues in detail.

Q2. What is the status of claim and dispute in the construction industries?

There is a census among researchers that construction industry suffers from high level of adversity and litigations. A considerable body of literature and reports by professional organisations support this argument.

The literature associates the high rate of claims in the construction industries to different factors such as the low rate of organisational learning in the project based organisations, presence of multiple interfaces in the projects and interdependency of the activities, intrinsic uncertainty of activities, technical complexities, long duration of the projects, etc.

Different procurement strategies and standard forms of contract have been introduced over years to overcome the problem of increasing claims in construction industries but the result was less than satisfactory. This question is answered in detail in chapter three.
Q3. What is the role of the contract in the prevention of claims?

Using three different theories (transaction cost economics, principal-agent theory and relational contracts) it is shown that a classic contract by itself is invariably incomplete and other non-contractual measures are required to preserve the bond between the parties to contracts. There is a trend in contract law from classical contracts to neoclassical contracts and then to relational contracts. This trend is reflected in the new procurement strategies such as partnering arrangements. Chapter three discussed the relationship between contract and claim. Chapter five of the thesis also exclusively looks into one of the most successful partnering projects in construction which has not experienced any claim. It investigates if such arrangements can be used in other large scale projects.

Q4. What are the main causes of claims in construction projects?

The literature review shows that many researchers have been conducted on causes of claim, causes of dispute and sources of uncertainty in construction projects. The results of these researches are very close to each other. This saturation of research into causes of claim and repetition of the identified causes of claims in new projects can be attributed the low rate of learning in project based organisation.

Standard forms of contract have attempted to control the identified causes of claims for many years. However there are various potential sources of dispute and claim in construction project (especially in major projects) and contracts can hardly cover all of them.

Chapter three reviews the literature on main causes of claim and some contractual measures to control them. This research also studied Iranian oil, gas and petrochemical projects in particular. Using different research methods such as cases studies, review of claim cases, interviews and questionnaire survey some of the main causes of claim in this sector is identified. These field works are presented in chapter eight of the thesis.
**Q5. How can claims be tackled by drafting appropriate contracts?**

As it is discussed in chapter four, any efficient control mechanism must contain both anticipatory and error-controlled feedbacks. In the construction projects contract functions as anticipatory feedback, however there must be some error controlled feedbacks beside them to rearrange the relationship between the parties to the contract should a conflict happens. In project management different error controlled mechanisms exist such as flexible contracts, open ended contract, alternative dispute resolution (ADR), etc. which must be used.

In the case of Iranian projects some area for improvement in the contract have been identified and discussed in chapter eight.

**Q6. What are the practitioners’ perceptions regarding claim?**

Using case studies, interviews using critical incident technique, reviewing documents and questionnaire survey, chapter eight gives an internal image of oil and gas construction projects in Iran.

Some of the findings are in line with what reported by the literature for instance presence of optimisation bias in client organizations, financial problems and delay in payments.

Others highlight some of the problems in contracts and procedures which are used in the Iranian projects for instance discrepancies and errors in basic engineering package, one-sided contracts and ambiguous (or changing) scopes of work.

**Q7. Is there any difference between claim management in Iranian large scale projects and global trends?**

The results of the questionnaire survey and interviews indicate that despite high number of claims and relatively high value of them the rate of litigations is very low.
Chapter seven investigated dimensions of the Iranian culture and explained this discrepancy using characteristics of the Iranian business culture.

Table 10.2 summarize how different part of the research answers the research questions.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Method used</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1 What is the nature of claim, dispute and conflict?</td>
<td>Literature</td>
<td>2</td>
</tr>
<tr>
<td>O2 What is the status of claim and dispute in the construction industries?</td>
<td>Literature</td>
<td>2,3</td>
</tr>
<tr>
<td>O3 What is the role of the contract in the prevention of claims?</td>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>O4 What are the main causes of claims in construction projects?</td>
<td>Literature, interviews, Questionnair, Claim cases</td>
<td>2,8</td>
</tr>
<tr>
<td>O5 How can claims be tackled by drafting appropriate contracts?</td>
<td>Literature, Case study, Interview, questionnaire</td>
<td>2</td>
</tr>
<tr>
<td>O6 What are the practitioners’ perceptions regarding claim?</td>
<td>Interview, questionnaire</td>
<td>8,3</td>
</tr>
<tr>
<td>O7 Is there any difference between claim management in Iranian large scale projects and global trends?</td>
<td>Literature, interviews</td>
<td>8,7</td>
</tr>
</tbody>
</table>

10.5. Contribution

There have been many studies on claims and their causes. Most of them used a questionnaire survey for identification of main causes of claim in the industry under investigation. However, some scholars believe that such causation of claims cannot be valid (for instance see Fenn, 2002 and Love, 2010). This research tried to draw a rich picture of the industries studied using different quantitative and qualitative method.

In complex projects there are various potential sources of dispute and claims and therefore identification and control of all of them is practically impossible (See chapter two). Entering complexity in construction claim and setting error control regulations for readjustment of relationships after formation of dispute will help parties to overcome the problem without need for knowing or controlling exact parameters which can cause dispute during the course of the project.

In the other word no matter what the cause of conflict is, putting error controlled feedback in place; any deviation from the contract can be corrected and conflicts can be dealt with as a black box.
The field works explain investigate how in practitioners attempt to keep continuity of their relationships despite claims and disputes in the projects.

Investigating into influence of culture in the people’s attitude toward claim in the Iranian oil and gas projects and entering complexity science in construction contracts are of main contributions of this research.

10.6. Recommendations for Practice

Based on the literature review and field works following recommendations are made for reducing claims in the Iranian oil and gas sector:

1. In major projects, basic engineering is usually performed prior to the bid for detail engineering or Engineering Procurement Execution projects (EPC or turn-key). A basic engineering package is a set of documents which are sufficiently comprehensive to allow a third-party contractor to carry out the detail design engineering, procurement (supply of equipment) and shall comprise of technical data and information as required. Basic engineering costs constitute only 2-5% of the project price. However, as it is the basis of tender in EPC projects, any error or discrepancy in basic package can lead to costly claims during the project execution phase. Currently basic designers are selected by tender and low price is one of the influential factors (if not the only one). Therefore the basic engineering package often contains errors and do not have the required quality. It is recommended that basic engineering be performed by experienced and trusted engineering companies regardless of its cost. Long term relationships between clients and conceptual designers based on trust is highly recommended.

2. The field works show that for different reasons clients tend to set an unrealistic time for completion of projects in contract. The Literature call such behaviour ‘optimization bias’ and show that is endemic in construction industry all over the world. Optimization bias could be source of claim as it leads to time overrun; therefore it is necessary that project schedule be as realistic as possible. Experience of previous projects and comparison with
actual completion date of similar projects can help reducing optimization bias.

3. Most of the studied projects have been affected by financial problems. In EPC projects on time payments are one of the few commitments of the client. Considering the scale of projects no contractor has financial mussel to absorb the effects of delay in payments. Therefore it seems essential to ensure that project funds are available before the commencement of the project.

4. Considering intrinsic incompleteness of classic contracts, conflict will arise in complex projects. Therefore contracts must be flexible enough to keep the continuity of the relationship between the contractor and client and help them rearrange their relationships. Flexibility in contracts can be enhanced by different measures such as fairness, reasonableness, using early warning systems, effective communication, using open ended contracts and cost reimbursable arrangements.

5. The contracts which are currently used in the Iranian projects are often one sided and unfair; standardization of these contracts and moving toward contracts like International Federation of Consulting Engineers (also known as: Fédération Internationale Des Ingénieurs-Conseils or FIDIC) contracts will be an improvement, though it cannot prevent claims.

10.7. Limitations of the Research
The inductive nature of the research brought a wide variety of issues to attention. In order to cover all these issues literature reviews are dispersed through the research both in the early chapters and in presentation of data and discussion chapters. Therefore the structure of the thesis is slightly different from the general practice.

As most of the data has been gathered from Iranian oil, gas and petrochemical projects, the socio-economical conditions of the country might have affected the findings; therefore the outcomes cannot be extrapolated to other industries. In the other word the research has idiographic perspective and does not intend to extrapolate the findings to other industries.
10.8. Recommendation for Further Research

Theoretical studies showed that contracts in general are not sufficient for preventing claim in major projects. Nevertheless many international and regional development banks require the projects funded by them to be procured under Fédération Internationale Des Ingénieurs-Conseils standard forms of contract (FIDIC) contracts as they believe they are less prone to litigation. In this research repeating problems in Iranian projects and the relevant contractual clauses have been compare to pertinent FIDIC clauses. A further study on projects which have been executed under FIDIC contracts may show the efficiency of these contracts and their potential weak points in avoiding claims.

This research highlights the importune of flexibility of contracts in preserving continuity of the relationships especially after formation of dispute in major construction projects. The balance between governability and flexibility is briefly discussed in the literature; however a thorough study on tools that can improve flexibility in the public contracts, and relationship between flexibility and accountability seems necessary. Such study requires access to the contracts, claim (or dispute) data, and detail information about the results of disputes and their consequences on both client and contractor.

The application of complexity science in construction claims management could fill the existing gap between the contract as a control tools and highly uncertain conditions which make the events hard to predict and control. As cybernetics theory suggests presence of a set of error-controlled regulations beside the anticipatory regulations are necessary for keeping a system in desired state. The focus of this research is on contracts and contract functions as anticipatory regulation. Presence of error control regulators in projects can be as effective in prevention of contract as contract. They can be mechanisms for systematically monitoring the project for detection and resolution of the dispute after their occurrence. A separate study could cover such non-contractual measures.
A comparative study of claims and disputes in major projects in Iran and other countries would tell more about the role of business culture and its role in rise and resolution of the disputes and claim.

These researches would benefit both contractors and clients who are involved in oil and gas sector. It is worth highlighting that access to sufficient qualitative data is of great importance for such researches and it could be challenging.
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GLOSSARY

ADR: Alternative Dispute Resolution. A set of confidential and flexible methods which provide individuals and businesses with framework for negotiating and settlement of their commercial disputes with the assistance of an independent neutral. It includes a variety of techniques including: mediation, conciliation, neutral evaluation, mini-trial or a combination of these and other techniques.

Complexity: Complexity is the state of a system which is associated with involvement of many parts and significant interrelations between these parts. Complex systems often produce unexpected and counter-intuitive results, therefore their function and outcomes are hard to predict. (See page 119)

Conflict of Interest: conflicts of interest can be defined as a situation in which an individual or corporation is in a position to exploit a professional or official capacity in some way for her personal or corporate benefit. A conflict of interest can exist even if there are no improper acts as a result of it.

Cultural Dimensions: Cultural dimensions are mostly psychological dimensions, or value constructs, which can be used to describe a specific culture.

Cybernetic: A Tran-disciplinary approach for controlling complex system. It explores regulatory systems, their structures, constraints, and possibilities.

Emic: In anthropology and y social and behavioural sciences an "emic" account is a description of behaviour or a belief in terms meaningful (consciously or unconsciously) to the actor;
that is, an emic account comes from a person within the culture. Almost anything from within a culture can provide an emic account.

**EP Contract:** A type of contract under which Under an EP contractor designs the installation and procures the necessary materials. However, construction and installation works are performed by another contractor(s).

**EPC Contract:** A type of contract under which Under an EPC contract, designs the installation, procures the necessary materials and builds the project, either directly or by subcontracting part of the work.

**FIDIC:** The International Federation of Consulting Engineers (Fédération Internationale Des Ingénieurs-Conseil in French). It is best known for its range of Standard Conditions of Contract for Construction which is used by many multinational development banks such as the World Bank in their projects.

**Mediation:** A form of alternative dispute resolution (ADR) in which a third party, the mediator, assists the parties to negotiate a settlement.

**Moral Hazard:** How can the client be sure that the most enthusiastic bid is not the most desperate one? Considering that ‘agent’ always has more information about his own capabilities than ‘the principal’ (i.e. information asymmetry), the principal has problem in encouraging his agent to consummate the contract instead of perfunctory performance of the contract. (Page 53)

**Optimization bias:** tendency for cost or duration of the project to be underestimated and benefits of the project to be overestimated and suggest that optimisation bias is caused by
failure to identify and effectively manage project risks (See Page 214).

**Principle Agent Theory:** It concerns the difficulties in motivating one party (the "agent"), to act on behalf of another (the "principal").

**Project Bank Account:** A trust bank account opened jointly by the Employer and the Contractor for the payment of certified work by the Main Contractor and Sub-Contractors, Suppliers and Consultants in the project.

**Relational contract:** A contract in which the parties prefer to negotiate and re-arrange the contract in order to keep its continuity rather than terminating the contract. Relational contract theory is characterized by a view of contracts as relations rather than as discrete transactions.

**Transaction cost:** The cost of making an economic exchange. It is mainly associated with cost of obtaining information, cost of negotiation and decision making and cost of monitoring and enforcing the contract (See Page 73).

**Turnkey:** See EPC contract.

**Major project:** Megaprojects (sometimes also spelled "major projects") are extremely large-scale investment projects. The US Federal Highway Administration defines megaprojects as major infrastructure projects that cost more than US$1 billion, or projects of a significant cost that attract a high level of public attention or political interest because of substantial direct and indirect impacts on the community, environment, and budgets. Other projects that cost less than $1 billion are sometimes also called megaprojects; it depends on the context, because a, say, $500 million project in a medium-sized town may be considered "mega," whereas this would not
necessarily be the case for a similar-sized project in a major world city. "Mega" also implies the size of the task involved in developing, planning, and managing projects of this magnitude. The risks are substantial. Cost overruns of 50% are common, overruns of 100% not uncommon. Similarly, substantial benefit shortfalls trouble many megaprojects. An interesting paradox exists for megaprojects: More and bigger megaprojects are being planned and built despite their poor performance record in terms of costs and benefits.

Morris and Hough (1987) defines major projects as “those which are particularly demanding either because of their size, complexity, schedule urgency or demand on existing resources or know-how”

**JCT:** The Joint Contracts Tribunal was formed by the Royal Institute of British Architects (RIBA) in 1931. Since then JCT has produced standard forms of construction contract, guidance notes and other standard forms of documentation for use by the construction industry.

**Inch Diameter (Inch dia):** Inch dia calculation is used for Fabrication & Erection works in piping.
Inch Dia = Nos. of weld joints x size of pipe (in Inch)
For instance if a welder is contracted to do say 100 weld joints, of a 1" pipe, then the total work involved is 100" dia welding work. If 100 weld joints of a 2" pipe is 200 weld work and so on.
It has been claimed for long that main contractors do not pay their sub-contractors on time and this can cause the problem to be shifted down the supply chain.

In harsh economic conditions, like what the industry is currently experiencing, it is natural that:

- Non-payments occur more frequently
- The consequences will be harder to absorb by the sub-contractors

There is also the possibility of insolvency of main contactor, this can cause the sub-contractor not to be paid for the works that have been performed and confirmed by the client. According to Federation of Small Businesses’ report 10% of the small business go through insolvency because of delayed or non-payment of the bills (The Times 14 April 2008).

Poor payment practices can also give rise to substantial additional financing and transaction costs. They also erode trust within the supply chain and act as a barrier to effective collaborative working.

In an attempt to address this problem The Office of Government Commerce (OGC) published the 'Guide to Best Fair Payment Practices'. From 1 January 2008, every public sector construction procurer and all members of the delivery team are expected to sign a ‘Fair Payment Charter’ which will set out a series of fair payment commitments that the parties will strive to meet. Where "practical and cost effective," the OGC recommends using a Project Bank Account (PBA) to help achieve these aims.
The PBA is a trust bank account opened jointly by the Employer and the Contractor for the payment of certified works by the Main Contractor and Sub-Contractors, Suppliers and Consultants in the project, instead of payment directly from the Employer or Main Contractor. Before the client pays any money into the account, the contractor must prepare an application for payment which includes a breakdown of the main supply chain payments.

Under the operating mandate for the account, the authorised signatories for the client and the contractor then release funds directly to the supply chain in the amounts contained in the contractor's breakdown. The account is governed by a trust deed, under which the key sub-contractors can claim the money if the contractor become insolvent. The trust deed prevents a receiver seizing the proceeds of the account.

The main benefits of PBA to public sector are:

- prevents contractors sitting on main contract payments and therefore provides greater certainty to sub-contractors that they will be paid
- lowers overheads related to debt chasing
- reduces the need for sub-contractors to build financing charges into their prices
- reduces disruption to projects caused by finance-related disputes between the contractor and the supply chain. This should result in the delivery of more on-time and value for money projects.
- to the extent that the practice of holding onto the cash was funding some bad contractors' operations, drive them out of the market
- provides contracting authorities with a greater visibility of the entire supply chain, allowing them to understand how sub-contractors are engaged, evaluated and managed.

According to Collingwood, PBAs despite all their benefits do not offer full security, leaving a number of questions unanswered: What about the employer's insolvency?
What about risk of bank collapse? Why are they limited to a single project payment and not the whole contract price?

Collingwood (2008) maintains that following option can provide the stake holders with more security:

- **Invoice discounting** – a well established means of generating discounted cash flow.

- **Letters of credit (LOC)** – a tried and tested method of providing a means of payment through a bank, which is considered to be as good as cash and which is negotiable in the market to aid cash flow.

- **Deposit of the full contract sum.** While this is unlikely to be attractive to employers there is the option of ring fencing the finance facility for the project to be drawn down against.

- **Payment guarantees** – another tried and tested method but only as good as the guarantor.

- **Vesting certificates** – these provide limited security over specific assets in return for cash.

To implement fair payment concept in standard forms of contract both JCT and NEC are now implementing PBA features in their contracts as an option. According to these procedures the contractor is required to submit an “application for payment” which shows the amount due to each named supplier. Following that, the project Manager issues a certificate for works, or material which has been provided. The employers pay the certified amount to the PBA accordingly. The contractor then completes the Authorisation, and confirms the payment to named suppliers and sends it to the project manager for countersignature. It is then sent to the bank.

Unless otherwise stated in the contract, the contractor pays all the charges and is paid any interest made by the project bank.
Figure 1 Recommended payment cycle (Source: OGC, 2007)
APPENDIX 2 - INTERVIEWEES’ PROFILES

Interviewee- 1
Position: CEO
Type of company: Construction company (civil, structure and mechanical installations)
Experience: 35 years

Interviewee- 2
Position: Legal advisor
Type of company: Legal advisor in major construction projects
Experience: 37 years

Interviewee- 3
Position: Project manager, Proposal manager
Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)
Experience: 15 years

Interviewee- 4
Position: Project manager of national projects (Isfahan refinery, Bandar Abbas refinery, etc.)
Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)
Experience: 40 years

Interviewee- 5
Position: Commercials manager, marketing director
Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)
Experience: 30 years

**Interviewee- 6**

Position: Commercial manager, marketing director

Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)

Experience: 31 years

**Interviewee- 7**

Position: Contract administrator, Lawyer

Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)

Experience: 18 years

**Interviewee- 8**

Position: CEO

Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)

Experience: 39 years

**Interviewee- 9**

Position: CEO

Type of company: Engineering and construction company (detail design, civil, structure and mechanical installations)

Experience: 29 years

**Interviewee- 10**

Position: Senior Project Manager

Type of company: Engineering and Construction company (basic and detail design, procurement)

Experience: 36 years

**Interviewee- 11**

Position: Senior construction Manager

Type of company: Construction and Installation company (civil, structure, electrical and mechanical)

Experience: 33 years
Interviewee- 12

Position: Project manager

Type of company: Construction company

Experience: 25 years
Statement of Confidentiality

The following questionnaire forms part of a PhD enquiry into claims and disputes in major construction projects. It intends to verify some results of more than 20 hours of interview.

Completing the questionnaire should take approximately 15 minutes. The study has been carefully developed to preserve privacy and confidentiality. The identity of individuals, organisations or organisational divisions will not be traceable as such information is not required. Your response will be kept in an anonymous electronic format on a secure university server and is protected against third party access. Your response will be used solely for academic purpose and will not be disclosed to third parties except that some anonymous samples might be seen by supervisor and examiners, as is normal for this kind of research. I hope this statement of confidentiality is sufficient to reassure you for your safety in participation.

Should you need more information about the research or any of the issues mentioned in this questionnaire, please contact me via email.

Mehdy Naimi
[mehdy.naimi@postgrad.manchester.ac.uk]

Section 1 - Taxonomy

1. What type of projects are you more engaged with?
   - Housing
   - Industrial and mining
   - Public facilities
   - Oil and gas
   - Petrochemical
   - Other, please specify

2. What is the value range of construction contracts you are dealing with?
   - Less than 1 million USD
   - 1 to 10 million USD
   - 10 to 100 million USD
   - 100 to 500 million USD
   - over 500 million USD
   - Other, please specify

3. What type of contract do you usually use?
4. What type of projects are you usually involved with?
- EPC (turn key)
- EP (Engineering and Procurement)
- Engineering
- Construction
- Other, please specify

5. Where are your projects located?
- Inside the special economic zones (e.g. Asaluyeh, Mahshahr)
- Other places in Iran
- Other, please specify

6. What is the main role of your organization in the projects?
- Client
- Design contractor
- Construction contractor
- Managing contractor
- Material supplier
- Other, please specify

7. How long have you been involved in construction projects?
- Less than 4 years
- 4 to 10 years
- more than 10 years

8. What is your position in project organisation?

9. What portion of your projects are public projects?[in percent]

10. Do you believe that disputes and claims are major problem in the construction industry?
- Yes
- No

11. How do you assess probability of occurring following types of claims in construction projects?
### 12. How severe do you assess following types of claims on performance of the construction projects?

<table>
<thead>
<tr>
<th>Type of Claim</th>
<th>Very Often</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in completion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost overrun</td>
<td></td>
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<tr>
<td>Non payment or delay in payment</td>
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<td></td>
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<tr>
<td>Change in work</td>
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<tr>
<td>Material related claims</td>
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<td></td>
</tr>
<tr>
<td>Negligence and quality of work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 13. What other types of construction claims are common in your area of work?

1. 
2. 
3. 
4. 
5. 

### 14. Have you ever referred a claim to court?

- [ ] Yes  
- [ ] No

### 15. If your answer to Q.14 is “YES”, have you been satisfied with the judgement?

- [ ] Yes  
- [ ] No

### 16. What are your reasons for avoiding litigation at court?

- [ ] Length of litigation
- [ ] Cost of litigation
- [ ] Inefficiency of courts in technical issues
- [ ] To avoid bad reputation in the industry
- [ ] Other, please specify
17. Do you prefer using Alternative Dispute Resolution (ADR) techniques (e.g. Mediation, adjudication, arbitration, etc.) instead of litigation if available?
   ○ Yes
   ○ No
   ○ I don't know

18. How do you assess effectiveness of the following measures in avoiding construction claims in Iranian construction industry?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Very Effective</th>
<th>Effective</th>
<th>Neutral</th>
<th>Ineffective</th>
<th>Very Ineffective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing legal awareness of project management team</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Drafting a detail contract</td>
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<tr>
<td>Using non-contractual measures in order to prevent dispute to escalate to claim</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Preparation of accurate and flawless tender documents</td>
<td></td>
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<tr>
<td>Effective communication between stakeholders</td>
<td></td>
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<tr>
<td>Considering &quot;escalation clauses&quot; in contract</td>
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<tr>
<td>Paying interest to overdue payments</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Using &quot;Project Bank Account&quot; to ensure availability of project fund</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Adopting comprehensive insurance policies</td>
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<td>Using standard forms of contract such as FIDIC or NEC3</td>
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<tr>
<td>Identification of potential dispute areas in the project, monitoring them and discuss them with the other party when necessary</td>
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<td>Having history of previous work with the same client</td>
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<td>Having expectation for future works from the same client</td>
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<td>Systematic documentation and record keeping</td>
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<td>Improving bidding procedures and moving from best price to best value</td>
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<td>Forming partnering between owners and major contractors</td>
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<td>Using alternative dispute resolution techniques (e.g. mediation) in projects</td>
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<td>Commitment to professional ethics</td>
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<td>Balancing one sided contracts (e.g. general conditions to contract)</td>
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</table>

19. Based on your experience, what other measures can be taken to avoid claims in major projects.
20. Do you agree that conflict can have any positive outcome?
   ○ Yes ○ No

21. If your answer to 'Q.20' is "YES", please explain.