Enhancing the Main Contractor-Subcontractor trusting relationship in the United Arab Emirates: A strategic approach to rebuilding trust in complex construction projects

دراسة حول تعزيز علاقة الثقة بين المقاول الرئيسي والمقاول الباطن في الامارات العربية المتحدة: النهج الاستراتيجي لإعادة بناء الثقة في المشاريع الإنشائية المعقدة

by

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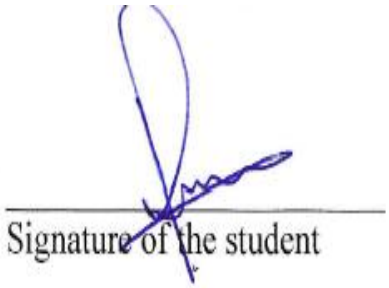

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Abstract

The oil price drop has significantly affected complex construction projects in the United Arab Emirates. After this crisis, adversarial relationships and trust issues between subcontractors and main contractors have increased, therefore, it has become necessary to rebuild trust between them.

This dissertation has developed a framework to effectively rebuilding trust between the subcontractors and main contractors throughout the project life cycle.

The purpose of this research is to investigate the subcontractors and main contractors' relationship in complex projects in order to identify the main trust dimensions that impact their relationship, and to define the main factors that contribute to rebuilding trust (i.e., developing, building, and maintaining trust) between them.

Based on Zand's (1972) interpretations, the researcher argued that trust is considered a gradual and self-reinforcing phenomenon that is not an isolated incident; rather, it is built up throughout a project life cycle or many projects.

The researcher found that trust factor has a significant impact on subcontractors and main contractors' relationship, however, there is minor impact of their relationship on building trust between them, and that early contractor engagement in the initiation and planning stage positively impacts the subcontractors and main contractors' relationship, and that the higher the level of trust between them, the better the project performance.

The research also provides recommendations for subcontractors and main contractors to improve their trusting relationships, in addition to recommendations for further study.

Abstract in Arabic

أثر انخفاض أسعار النفط بشكل كبير على مشاريع البناء المعقدة في دولة الإمارات العربية المتحدة بشكل ملحوظ. وبعد هذه الأزمة، ازدادت العلاقات بين الخصوم والثقة بين المتعاقدين الرئيسيين والمتعاقدين من الباطن، ولذلك أصبح من الضروري إعادة بناء الثقة بينهما.

الغرض من هذا البحث هو دراسة العلاقة الرئيسية بين المقاولين والمقاولين من الباطن في المشاريع المعقدة، من أجل تحديد أبعاد الثقة الرئيسية التي تؤثر على علاقتهم، وتحديد العوامل الرئيسية التي تسهم في إعادة بناء الثقة (أي تطوير، والحفاظ على الثقة) بينهما.

استنادا إلى تفسيرات زاند (1972)، قال الباحث, تعتبر الثقة ظاهرة تدريجية وتدعيم ذاتي ليست حادثة معزولة، بدلا من ذلك، بنيت طوال دورة حياة المشروع أو العديد من المشاريع.

وفقاً لنتائج البحث، هناك تأثيراً كبيراً للثقة على علاقة المقاولين الرئيسيين والمقاولين من الباطن و لكن لا يوجد تأثيراً لعلاقتهم على بناء الثقة بينهم ، وأن التعاقد المبكر في مرحلة البدء والتخطيط تؤثر تأثيرا إيجابيا على العلاقة الرئيسية للمقاولين والمتعاقدين من الباطن، ومستوى الثقة بينهما، وأفضل لأداء المشروع. و قد وضعت هذه الورقة إطارا لإعادة بناء الثقة بشكل فعال بين المقاولين الرئيسيين والمقاولين من الباطن طوال دورة حياة المشروع.

كما قدم البحث توصيات للمقاولين الرئيسيين والمتعاقدين من الباطن لتحسين علاقاتهم القائمة على الثقة، بالإضافة إلى توصيات لمزيد من الدراسة.

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Chapter one: Introduction

1.1 Introduction

Many stakeholders are involved in construction projects, such as owners, consultants, designers, governments, main contractors, subcontractors and suppliers. Each stakeholder has his responsibilities and rights (Hinze & Tracey 1994; Wood & Ellis 2005; Chiang 2009; Dainty et al. 2001; Walker 2015). However, subcontractors do a considerable amount of construction work. Hence, it is highly significant for prime contractors to have healthy and smooth relationships with them, since these relationships may impact project performance, such as cost, quality, and time frame (Meng 2012; Clough et al. 2015; Wu & Tang 2015).

Industry professionals have always faced challenges regarding relationship management in the construction sector, such as less trustworthy relationships, less cooperation and ineffective communication, which may result in the low performance of a project since all parties have different interests and goals (Moor et al. 1992; Meng 2012; Chan et al. 2004). The oil price drop in the Middle East has added more pressure on projects, and in turn, on organisations in terms of cost, timeframes and scope, which has also increased the loss of trust between subcontractors and main contractors. This research investigates the literature on the main contractors' and subcontractors' relationships by developing a framework to rebuild trust effectively. To examine the main contractors' and subcontractors' perceptions towards each other to form a trusting relationship, the researcher identified the main trust dimensions that impact main contractors' and subcontractors' relationships. In addition to defining the main factors that contribute to rebuilding trust (developing, building and

maintaining trust) between them, and finally, to suggest recommendations for improvements to enhance the main contractors' and subcontractors trusting relationships. The introduction chapter of this dissertation will focus on the background of the importance of trust between stakeholders in construction projects. Further, the introduction includes a definition of the main problem of the research, as well as the aim, objective and scope of the dissertation.

1.2 Background

Causes of project failure in the construction industry can vary from a lack of planning and unclear projects goals to gaps in communication. Occasionally, a trigger can lead to the complete failure of a project and an organisation, such as an insufficient health and safety violation that can cause harm and causalities.

In 2015 during Hajj in Mecca, Saudi Arabia, a crane collapsed and crashed into the ceiling of the grand mosque of Mecca due to a high wind. According to the *Daily Mail*, the accident killed 107 people and wounded 238, (CRONE 2015; DW 2015). In a report by Foreman (2016), the author asserts that the Saudi officials blamed the prime contractor and barred the organisation from continuing their projects in the Kingdom, thus leading to financial losses of billions of dollars, laying off more than 50,000 workers and suspending the project until the investigation reached a conclusion.

This tragedy has negatively impacted the main contractor, who is a leading construction contractor in Saudi Arabia whose leaders were highly trusted and close to the Saudi royal family. Furthermore, the accident impacted their reputation in the market as a leading company in complex projects, as well as their trusting relationships with the Saudi officials,

their capability to continue their projects and their financial commitments and plans, which thus led to a massive loss of trust in the area (Foreman 2016; DW 2015).

Trust is a leading factor in the success or failure of construction projects (Latham 1994; Egan 1998). Moreover, partners' intentions and perceptions towards each other influence the tendency to trust each other or to be suspicious of other people in social psychology (Deutsch, 1962). Researchers argued that trust is a mechanism to withstand the exploitation of one party to another as a result of the commitment of one partner to another (Lau & Rowlinson 2009). Also, the authors stated that maintaining healthy relationships with other people can be considered crucial.

Lau (2011) indicated that trust is a noticed quality in people when describing a relationship. For example, when managers perceive trust with subcontractors, they are most likely heading towards building a partnership; therefore, ‘real’ relationships can be found by testing the perceptions of each partner (Morgan & Hunt 1994; Campbell 1997; Salmond 2007).

Trust is also defined as the willingness to depend on an interchange partner or party who has confidence (Moorman et al., 1992). Moreover, Chalker and Loosemore (2016) stated that once the trust is achieved, the trustor can go further in confidence. Lau (2011) concluded that this confidence is built through significance and not only by fulfiling promises in project work. As a result, subcontractors develop and redevelop their confidence for long-term durations through trust.

Trust can also maintain healthy relationships, smooth communication between subcontractors and main contractors, and build a commitment to gain the mutual goals required. Since it has a significant qualitative factor that allows external service providers

to participate with organizations as partners smoothly and enable them to share data, such as schedules and costs, and integrate those subcontractors in projects' activities (Kanda & Deshmuck, (2007).

Even though trust may not prohibit actual risks from happening, it can be considered a perceived risk absorption technique, where risk refers to the trusting relationships and mitigates conflicts and uncertainties through creating contracts to build and rebuild healthy relationships, and vice versa (Salonen 2004; Lau 2011). In this chapter, this research defines the problem and motivation of the research, followed by addressing the aim, objectives and scope, in addition to the research questions.

1.3 Problem Definition

Since a complex project may include specialties that not all parties are capable of having expertise in, the greater the level of complexity in a project, the greater the need for trust. In such projects, main contractors have to rely on expert contractors and vendors to complete the project, and as a result, they have to rely on communications and actions. For example, main contractors want to feel confident that their subcontractors are going to be able to finish and deliver the services as per the agreements and specifications agreed upon (Das & Teng 1998). However, a complex project often has more information and multiple interfaces between all parties, which may lead to serious conflicts.

Also, since the attributes of large construction projects may include and not be limited to high risks, complexity and uncertainty, it is crucial to managing the relationships of participants, such as stakeholders, project teams, subcontractors and suppliers since issues may appear in payments, schedules and quality. As a result, defensive behaviour and adversarial relationships will also be performed (Lau & Rowlinson 2011).

Major projects include a high level of informational complexity, which will be added when the amount of information is high; that is, when it flows between parties, and where large packages, specialist contractors and other stakeholders are included. In turn, high levels of informational complexity also lead to organizational complexity (Mcdermott, Khalfan & Swan 2005).

As of today, contracting is not limited to infrastructure projects; rather, it has been enlarged to mega projects that include intricate designs, information and a broad range of experts from multiple different groups. Hence, these projects require more than just high technological solutions but also proper management and integration.

In addition, main contractors use up to 90% of project turnover on buying goods and services, which subsequently generates opportunities or issues for subcontractors and contractors' collaboration (Nobbs 1993; Hinze & Tracey 1994; Vrijhoef et al. 2001). However, many organisations, groups and professionals have criticised the construction industry in its failure to build up effective teams; thus, distrust is becoming more frequent in construction projects across around the world (Baiden et al. 2006); (Wood & McDermott 1999a).

Even though the United Arab Emirates has a fast growing economy and is considered to be the most open economies in the world, the UAE has faced a severe impact in the construction field during the oil price drop that occurred in 2015 (EY 2016). In an article for EY – a global leader in tax, transaction, assurance, and advisory services, the author indicated in an article entitled "Drop in Oil Prices and Its Impact on Gulf Cooperation Council (Construction) Market " that slumping oil prices have negatively affected the Gulf Cooperation Council and the United Arab Emirates in particular. Moreover, the oil slump

also affected the government's revenues, spending plans, commitments, economic growth and its priorities on the infrastructure projects (EY, 2016).

Also, the Gulf Cooperation Council lost 20% of its combined GDP (US$ 340B) in 2015 as a result of the oil price drop, and consequently, real estate transactions declined to an average of 20%, construction contracts were down by 15%, with contractors and subcontractors also facing payment delays (EY 2016).

As a result, construction companies have encountered a crisis and suffered trust loss. D&S, which is a leading contracting firm in the Middle East, is a great example as it experienced a loss of trust in Saudi Arabia. In mid-2015, D&S relationships with its stakeholders were damaged, and levels of trust became the lowest ever reached in the Gulf Cooperation Council. Rebuilding this confidence with all their stakeholders, especially their subcontractors, was the main strategic approach.

Trust loss nowadays appeared more frequently in this industry, particularly after the oil price dropped across the world, specifically in the Middle East and Gulf regions (Gulf Cooperation Council n.d.) and the United Arab Emirates in particular. The United Arab Emirates constitutes 50% of the construction projects in the GCC, and has numerous active construction projects with an estimated value of 749.5 Billion USD. This has negatively affected the trusting relationships between stakeholders, since issues and conflicts have appeared between clients, main contractors and their subcontractors and suppliers.

This dissertation is going to investigate the literature on the subcontractors and main contractors' relationships and explore the factors and barriers that impact the trusting relationships between subcontractors and main contractors in construction. Then, the research will examine the main contractors' and subcontractors' perceptions towards each

other, in addition to the framework that will be built in Chapter three. Next, the study will analyse the results of the questionnaires using quantitative research methods in order to suggest improvements to enhance the subcontractors and main contractors' relationships in the United Arab Emirates, in addition to further research recommendations.

1.4 Aim, Objectives and scope

The aim of this study is to investigate the relationship between subcontractors and main contractors and associated factors that impact trust between parties in construction projects in the United Arab Emirates. The research will also help in suggesting improvements that will enhance the relationships between contractors' and subcontractors.

1.4.1 Specific Objectives

This dissertation aims to achieve the following objectives:

1. Investigate the literature on the relationship between subcontractors and main contractors.
2. Develop an approach to rebuilding trust effectively (develop, build and maintain) between subcontractors and main contractors throughout the project life cycle.
3. To examine the main contractors' and subcontractors' perceptions towards each other to form a trusting relationship.
4. Identify the main factors that affect the relationships between subcontractors and main contractors.
5. Define the main factors that contribute to rebuilding (develop, build and maintain) trust between subcontractors and main contractors during the crisis.
6. Suggest improvements to enhance the main contractors' and subcontractors trusting relationships.

1.4.2 Scope and limitation of the study

The extent of this research is to investigate the existing literature to find out more information regarding the relationship between the subcontractors and main contractors, as well as the most crucial factors that impact the trusting relationship between subcontractors and main contractors. Also, this research will suggest an improvement to enhancing the subcontractors and main contractors trusting relationship.

As Gambetta (1988) notes, trust is usually acknowledged but seldom examined. Researchers have studied the dimensions that comprise buyer-supplier relationships, such as commitment, and trust through theoretical frameworks, however, they did not pay close attention to the dimensions that speculate the greatest significance in the main contractor and subcontractor relationships as there is limited evidence of the impact of the trust on project performance (Mayer et al. 1995; Lau E. & Rowlinson 2011).

The limitations of this research include:

1. The research has only investigated main contractors and subcontracting trusting relationships in the United Arab Emirates.
2. The research has focused on the main contractor-subcontractor relationship, excluding other stakeholders, such as clients, suppliers and consultants.
3. The research has focused on Category (1) building contractors only, since the study examines complex construction projects in which their value equals or exceeds 100 M AED.
4. The research questions were created for large complex projects, excluding other lower scale projects that are less than 100 M AED.
5. This study examines the subcontractors and main contractors trusting relationships after the subcontractors' selection stage, which means after signing the contract for a project.

1.4.3 Research questions

This dissertation attempts to answer some of the issues in the literature regarding the significance of forming close long-term relationships with subcontractors, to examine the willingness of contractors and subcontractors to trust each other and to build such a relationship and answer the following questions:

1. In the United Arab Emirates, what is the perceived level of trust available to prime contractors and subcontractors?
2. What are the factors that impact subcontractors and main contractors' relationships in complex projects?
3. What are the factors that impact developing, building and maintaining trust in the project life cycle?
4. What stages, approaches and strategies may be suitable to develop, build and maintain trust between subcontractors and main contractors/suppliers in the project life cycle?
5. What are the suggested improvements that could enhance the relationship between contractors and subcontractors?

1.5 Dissertation Structure

The first chapter of this dissertation focuses on the background of the importance of trust between stakeholders in construction projects. It also defines the main problem of the research, as well as the aim, objective and scope of the dissertation.

The second chapter gives a comprehensive literature review of the main contractor-subcontractor trusting relationship. Also, it examines the main factors that impact the relationship between the subcontractors and main contractors, and identifies and analyses trust in complex projects consisting of hundreds of contracts. Further in this chapter, the author looks at the main factors that contribute to rebuilding trust (i.e., develop, build and

maintain trust) between subcontractors and main contractors, in addition to the risks associated with these trusting relationships in order to further investigate the literature in order to find approaches that enhance the main contractor-subcontractor relationship during the project life cycle and the significance of engaging subcontractors early in the project.

Chapter three builds a conceptual framework based on the finding in the literature section, which is then followed by a strategic approach constructed to suggest a solution to the problem.

Chapter four discusses the research method used, which comprises the research design, population, data collection, sample, questionnaire design and content, pilot study, data analysis process, validity and reliability of the research and ethical consideration. Following this, a survey will be distributed to professionals from the subcontractors and main contractors to analyse the data collected.

Chapter five uses the framework to study the impact of trust on the contractor-subcontractor relationship and the perceptions of how both parties see each other by analyzing the findings of the questionnaires using quantitative research methods.

Chapter six suggests improvements to enhance the main contractors' and subcontractors' trusting relationship in the United Arab Emirates and give a conclusion and recommendation, in addition to the recommendation for further research.

Chapter Two: Literature Review

2.1 Introduction

How we define trust? The meaning of the word trust is varied in the literature, and is known for its variety in social relations (Gambetta 1988). Moreover, according to Mistzal (1996), Child (2001) and Rousseau et al. (1998), there is no accepted universal definition of trust. However, there is an agreement on the importance of trust in the context of business – it is the willingness to rely on others actions, to depend on them, and hence, be vulnerable to them, thus increasing the willingness to cooperate (Mcdermott et al. 2005).

Trust relations are based on having long term influence on relationships and shared values when this behaviour is noticed in situations, such as communication, relations, conflict with others and contract (Lau E. & Rowlinson 2011). Four types of trust impact relationships: knowledge based, generalized, contractual and goodwill, all of which can be built at the inter-firm and interpersonal levels.

The behavioural consequence of trust appears in the cooperation, coordination and collaboration form, which are motivated by the types of the value-based trust. The value elements are social trust (interaction need), moral trust (intrinsic need), management trust (control need) and economic trust (appropriate reward need) (Lau E. & Rowinson, 2011). The critical issue in this regard is how each participant perceives trust when more than two members are involved in a group. The value-based differences must be dealt with in order to develop trust, which means that values between the participants should be addressed in the planning and the implementation stages, which continues until the closing of the project. Hence, the differences in values to set plans, back up plans, procedures and

processes to minimize the results of these differences require clarification (Williamson 1993).

Williamson (1993) also suggested two other types of trust: personal and institutional trust. Institutional trust refers to the organizational and social context of the contractual base, regardless of whether the personal trust is not relevant to the commercial exchange and is suggested to be non-calculative (Williamson 1993; Sako 1992).

On the other hand, interpersonal trust is the ability of one party to be vulnerable to others' actions (Ding & Ng 2007; Ding et al. 2013). Hence, trust is a factor that enhances performance, however, it is not enforced through contractual and legal arrangements (Doloi 2009). However, one party may think that there is a risk of negative results rather than positive outcomes.

Propensity, on the other hand, and according to Yee et al. (2015), is a characteristic form of trust described as when a trustor is willing to trust other parties without previous history or information.

According to Ding et al. (2013), affect based trust is the emotional bonds between the trustee and the trustor. On the other hand, cognition-based trust is when the trustor will trust under what circumstances and in which respect.

Other scholars defined two types of trust, such as Smyth and Edkins (2007), who defined trust as being socially-oriented and self-interested. Socially-oriented trust is a deep kind of trust and is created through the requirements of commitments in a social network. It is based on encouragement, support and reputation, while self-interested trust is identified as the willingness of one party to trust another party without having evidence.

Inter-firm trust is better understood than interpersonal trust, according to Chalker and Loosemore (2016). Moreover, inter-firm trust has been found to be the primary element to effective partnering, which enhances efficiency in the construction industry. However, inter-firm trust can not exist without a a degree of interpersonal trust.

A generic model of trust was developed by Tan and Theon (2001) for electronic commerce, whih consists of two fundamental elements: control trust and (party trust) trust in the trustee. Control trust and party trust are reliant on many objective and subjective causes. This framework assumes that people engage in a transaction if their level of trust is beyond their threshold. Hence, the transaction type and the other included groups can predict the threshold level. In an e-commerce atmosphere, the risks pertain to the information the other parties have in the transaction, the mechanism of the controlling designated protocols and the processes that control and monitor the operation performance. In light of this, Tan and Theon proposed three situations:

1. The case of information asymmetry that is intermediate when one group has data that the trustee does not have.
2. The total ignorance situation, when none of the groups has data related to the business.
3. The perfect information condition, when all participants know all the details of the transaction.

On the other hand, party trust is the trust concept adopted by Mayer et al. (1995), who stated, "The trust is the readiness of a group to be vulnerable to the actions of another group according to the expectations set together between the two parties to do a job or a task that crucial to the trustor and the capability to control and monitor the trustee." The control trust, however, is the concept adopted by Bons (1997), in which he defined trustworthy

procedures as, "A trading process that protects the transaction in which the behaviour risk by the parties can be available, but it provides control to minimize the risk." Even though an effective monitoring can be taken as a personal element, the result will be a group of principles for trade processes that indicate that when a particular process has enough control, however, the laws are designed to be objective:

Transaction trust= Control trust + Party trust

Hence, it depends on two points when it comes to the type of trust: the first point is the participant's perception of the other group, and second, the stage or phase of the project life cycle.

2.2 Critical review

Trust has become an important research subject in business management due to its significance in cooperation enhancement, thus achieving better performance in organizations (Mcdermott et al. 2005). Additionally, prime contractors spend 90% of their project turnover on buying services, which creates opportunities for the subcontractors and main contractors' cooperation, in addition to its significance to manage subcontractors (Hinze and Tracey 1994; Vrijhoef and Koskela 2000; Nobbs 1993).

However, according to Mollering (2001), trust is an irrational phenomena that an individual may decide to trust despite unknown outcomes. Maturana et al. (2007) stated that trust has a transactional nature that enables prime contractors to allocate or effectively transfer risks away from their firms to subcontractors. Also, they indicated that collaboration between subcontractors and main contractors is hard to achieve, since the bidding process in the pre-construction stage is destructive in the long term, in that it requires the need to minimize

the transactional costs, which tend to reduce client satisfaction and reduce quality (Mollering 2001). Thus, the emphasis on cost competition and the traditional, adversarial main contractor-subcontractor relationship, resulted from the difficulty in collaboration between subcontractors and main contractors, in addition to the disputes, which are common in the construction industry (Maturana et al. 2007).

However, Hosmer (1994a, b) stated that trust leads to commitment and accordingly leads to achieve innovation and cooperation (Yeung et al. 2009). Moreover, Rowlinson et al. (2008) argued that trust and commitment are significant to any group working relationship that is built externally with consultants, clients, sub-contractors and suppliers, or internally with employers and employees. Also, Fukuyama (1995) said economic activities contain 80% contractual transaction and 20% human behaviour, such as values, norms and beliefs, which can be monitored and controlled. One significant monitoring tool is 'Trust', which also functions as 'Human Capital'.

Similarly, people work together in organisations and groups for a purpose, and 20% can make one firm more successful than other if we consider that most organizations can achieve 80% technically (Lau and Rowlinson 2009).

Trust is seen as a basis for achieving the outcome in the organizational management, possessing integrity and demonstrating concern (Shaw 1997). In an individual perception of trust in appraisal, trust can be measured by integrity, ability and benevolence, according to Meyer and Davis 1999).

Scholars have found that trust enables organisations to keep their continuous improvement and adjust faster to unforeseen circumstances, in addition to increasing learning or

"innovation"; hence, it will affect the performance of groups by offering better coordination and superior efficiency (Sako 1998; Dirks 1999).

Thus, relationships have to rely on high levels of trust to achieve collaboration. Elevated levels of trust increase communication between parties, which, in turn, increase the understanding of all parties (Ruppel and Harrington 2000; Argyris 1973; Johnson and Johnson 1989; Doloi 2009; Lau and Rowlinson 2009).

Trust also has a significant impact on building and developing stakeholders' relationships in a project (Karlsen et al. 2008 in Brewer and Strahorn 2012; Zuppa et al. 2016).

Moreover, trust is one of the most significant key factors to building successful teams (Chow et al. 2012; Brewer and Strahorn 2012; Rahman and Kumaraswamy 2004, 2011, 2008; Zuppa et al. 2016). Hence, if a project manager can build relationships through trusting behaviour, loyalty will be given to both the firm and the project (Brewer and Strahorn 2012; Beslin and Reddin 2004; Zuppa et al. 2016).

However, trust is usually acknowledged but seldom examined (Gambetta, 1988). Most researchers have studied buyer-supplier relationship dimensions, such as commitment and trust, through theoretical frameworks. However, they did not pay great attention to the aspects that speculate the most significance in prime contractor and subcontractors' relationships, while there is limited evidence of the impact of the trust on project performance (Lau E. & Rowlinson 2011).

This dissertation investigates the literature on the relationship between subcontractors and main contractors. In addition, it identifies the crucial factors and barriers that impact trust in a project between subcontractors and main contractors, as well as defining the factors that contribute to rebuilding trust (develop, build and maintain) in order to identify an approach

and strategy that enhances the trust relationships between subcontractors and main contractors. Next, a framework will be constructed and examined using quantitative research methods. After that, the study will analyze the findings and results to suggest improvements for the trust relationships. Finally, conclusions and a recommendation will be given for further research.

2.3 Main contractor and Subcontractor relationships

A subcontract is an agreement between a prime contractor and subcontractor to define both parties' responsibilities, obligations, risk sharing mechanisms and rights from the perspective of the contractual relationship (Yongtao et al. 2017). A subcontractor works for the prime contractor to a carry out a particular part of the construction activity on behalf of him. The main contractor is responsible for supervising the subcontractor's work to make sure that the work is being done according to the owner's requirements, in addition to coordinating with another group of contractors. There are several relationship types between subcontractors and main contractors, such as long term relationship, short term relationships and hostile-dependent relationships (Yongtao et al. 2017).

Some relationships between subcontractors and main contractors, which are cooperative and collaborative with performance history, may last for more than ten years (Akintoye and Main 2007; Chan et al. 2004). Thus, these relationships have mutual benefits through treating the other as a long term partner (Eom et al. 2015).

On the other hand, other main contractors have short term business relationships with other subcontractors who have specific abilities. According to the prime contractor's procurement strategy, main contractors may choose to go for in-house if the activities and

resources are available and can achieve a competitive advantage. If the operation does not achieve the competitiveness required and if the resources not available, they may go for outsourcing (subcontracting) (Moore et al. 1992; Dainty et al. 2001).

Scholars have argued that firms must check the organisation to achieve the sources of the competitive advantage instead of the competitive environment. This approach is explained by the resource-based view theory. According to Wernerfelt (1984), the resource-based view approach suggests that to achieve a competitive advantage it is necessary to consider the significant resources to the organization's performance. It is useful to make use of the external opportunities by using the available resources inside the organization, rather than requesting external skills (Barney 1991; Rothaermel 2012; Issa 2015).

Some factors impact the main contractor and subcontractor relationship during the construction period, such as open communication, coordination, conflict level and mutual trust, etc. (Yongtao et al. 2017). According to Tomkins et al. (2001), trust can be considered a risk absorption method to information sharing, even though it does not prohibit the actual risk from happening. Moreover, uncertainties can be mitigated by trust between subcontractors and main contractors, according to Salonen (2004). However, if the relationship between subcontractors and main contractors went down, conflict levels may arise, which may lead to potential risks, and if they are not solved or well-managed, claims and disputes may occur.

Hence, this research argues that the trust factor is one of the most crucial factors among those identified by Yongtao et al. (2017) and illustrated in Table 1. All other factors can be

considered as dependent variables on the trust factor.

Identified factors	Literature sources
Long business relationship	El-Abbasy et al. (2013)
Open communication	Clough et al. (2015)
Effective coordination	Aagaard et al. (2015)
Mutual trust	Chalker et al. (2016), Manu et al. (2015), and Tam and Hadikusumo (2015)
Dispute/problem resolution	El-Abbasy et al. (2013)
Delay of payment to subcontractors	Clough et al. (2015) and Harris and McCaffer (2013)
Nature and conditions of contract	Clough et al. (2015), Moore et al. (1992), and Schaufelberger and Holm (2002)
Company culture	Harris and McCaffer (2013) and Walker (2015)
Selection method of subcontractors	Araœjo et al. (2015), Kumaraswamy and Matthews (2000), and Ulubeyli and Kazaz (2016)
Subordinate position of subcontractors	Chiang (2009), Dainty et al. (2001), Eom et al. (2015), and Hinze and Tracey (1994)
Main contractors' authoritative attitude to subcontractors	Manu et al. (2015) and Wood and Ellis (2005)
Risk sharing (protect profit margin of both)	Feng et al. (2015), Kululanga and Kuotcha (2010), Manu (2013), and Sarkis et al. (2012)
Knowledge sharing	Wu and Tang (2015)
Early involvement of subcontractors	White and Marasini (2014)
Private communication	White and Marasini (2014)
Information technology support and facilitation	White and Marasini (2014)
Environment, health, and safety	Feng et al. (2015), Kululanga and Kuotcha (2010), Manu (2013), and Sarkis et al. (2012)
Prospects of future collaboration	Aagaard et al. (2015)

Table 1 Main contractor-Subcontractor relationship impact factors (Yongtao et al. 2017)

2.4 The role of Trust in the construction industry

It has been criticized by many organizations, groups and professionals that the construction industry failed to build up effective teams (Baiden et al. 2006). Nevertheless, researchers and experience shows that distrust appears more frequently in construction projects rather than trust (Wood & McDermott 1999a).

The environment of the construction industry includes trust relations that are needed for the sake of the success of the construction projects for the project management. However, large construction projects include risk, complexity and uncertainty. Therefore, it is important to manage the relationships of participants, such as stakeholders, project teams, subcontractors and suppliers, since issues may appear in schedules and quality. As a result, defensive behaviour and adversarial relationships will also appear in the project (Lau and Rowlinson 2011). Moreover, since large projects include a high level of complexity, informational complexity will be added when the amount of information is high, which flows between

parties, where large packages, specialist contractors and other stakeholders are included, thus leading to organisational complexity (Mcdermott, Khalfan & Swan 2005).

For example, main contractors want to be confident that the subcontractors are going to be able to finish and deliver the services as per the agreements and specifications agreed upon, and this confidence can be developed by a source called "Trust" (Das & Teng 1998).

As of today, contracting is not only exclusive to infrastructure projects, as it has been enlarged to mega projects that include complex designs, information, and a number of people involved, which thus requires a broad range of experts from multiple different groups. Hence, these projects often require more than just high technological solutions but also proper management and integration.

A study by the Construction Industry Institute (1993) found that there was a direct link between trust and saving time and reducing costs. Yeung et al. (2009) have indicated eight KPIs (Key performance indicators) perceived to enhance and support trust; namely, cost, time, profit, productivity, quality and safety that are used to assess a relationship-based projects' success. Rowlinson et al. 2008) stated that trust is crucial when the following points exist in a relationship:

1- Uncertainty arising from unseen risks.
2- Signing a contract form.
3- Threats regarding missing opportunities.
4- Developing a business relationship at a higher level.
5- Negotiation to avoid confrontation.
6- Members of a group achieving alternative targets.

Hence, trust relations concern individuals in the construction industry, where most literature showed that trust helped to increase flexibility in facing uncertain situations, as

well as increase efficiency, soften the construction processes and maintain long-term relationships (Lau 2011).

2.5 Trust Dimensions

Trust cannot be considered as a one-dimensional phenomenon (Laeequddin et al., 2012). It is, therefore, a multifaceted and complex concept, and it is an extraordinary challenge to buil, develop and maintain it. Scholars have identified a number of trust dimensions, such as behaviour (competence), feelings (motives) and beliefs (commitment) (Sako 1992; Ganesan 1994; McAllister 1995; Mittal 1996; Wood & McDermott 1999a).

2.5.1 Cultural significance

The importance of culture lies at the core of managing change (Owens, 1987). Schein (1985) considers organization culture as patterns of shared values and beliefs that develop into behavioural norms that are used to solve problems. The definition of culture is the way a group of people live, and attributes of behaviour that can be considered valuable and useful to the concerned individuals and pass these characteristics from generation to generation (Rowlinson et al. 2008).

From a social side, Wood and McDermott (1999) defined trust as the following:

"Trust is a multidimensional and multifaceted social phenomenon, which is regarded by some as an attitude, and by others as a personality trait and as a vital social lubricant".

Ding and Ng (2010) stated that attitude on work and social interaction significantly impacts trust, hence, they recommended that managers should encourage social interaction between individuals and assess these individuals to create and develop the right attitude so that trust can be improved.

On the other hand, assumptions were made between workplace and business interaction. As an example, Australian people are not scared of confrontation, and they would expect honest and straight forward communication, whereas the Chinese often expect there to be no confrontation with superiors – whether they be managers, clients, etc. However, the English show politeness and a sense of pride to others, although there is a often sense of mistrust between participants (Rowlinson et al., 2008).

According to Das and Teng (1998), trust is referred as the determination of positive behaviour (motives) of the trustee, whereas Lewicki et al. (1999) consider trust in a positive manner when an individual shows morality. Many scholars have also concluded that trust also has a positive social impact that affects firms and individuals.

Social trust is explained as a connection from State A (disequilibrium or nonnormal) to state B (equilibrium or average) (Earle & Cvetkovich, 1995). Further, social trust also contains the in-group and out-group hypothesis, whereby individuals will act differently in groups and have a cultural impact, for example, in the hierarchy of needs, according to Nevis's model, in which he showed that in Chinese culture, social needs are higher than in western culture (Nevis 1983).

Trust is also considered to have several levels that are essential for negotiation success (Fisher & Ury 1983). Trust can also be implied in a different culture; for example, American negotiators may attend a meeting with complete trust in the other party, unless the other party shows otherwise, while French negotiators may attend a meeting with a clear mistrust of the other group, according to Jackson (1993). On the other hand, the typical Chinese negotiation process can be summarized as Avoiding, Accommodating, Collaborating, and Competing (Westwood 1993; Lau 1999; Lau & Rowlinson 2005).

The Japanese, for example, tend to rely on mutual trust and have a high tolerance of ambiguity; Westwood (1993) concluded that this is a way to avoid making mistakes or false statements, since many executives in Asian countries negotiate indirectly to stay away from confrontation.

Shared values, for example, are the next level in a culture which plays a vital part in connecting people in a firm. It contains a set of orientations between members of an organization, group or society (i.e., the main contractor and sub-contractors). When these orientations are taken together, they solve issues that all groups have to resolve to stay viable. Punnett (1998) and Wood et al. (2001) suggested that culture provides orientation to groups and it is interrelated, but not all shared values are agreed by all members in firms. At the deepest level of culture, truths and assumptions are developed and shared by people throughout their experience in the company. Therefore, culture can be learned, interrelated and shared.

Successful organizations have the same cultural attributes; however, strong cultures often have common values, according to Wood et al. (2001). Moreover, the researchers argued that there are benefits for unique shared values, such as:

1- Improved commitment.
2- Offer a well-built corporate identity.
3- A reduction in the requirement of formal controls.
4- Offer a social system.

The way contracting parties build up their relationships is impacted by the contractual influence over these relationships, which enhances mutual knowledge and trust by creating an open book of information sharing and assessments of other parties' risks.

It is often found that in failed projects, people or groups often do not understand the firm organization culture or that the existing culture does not support people's efforts. For example, groups or people often seem to work more in resistance to each other than as a team cooperating in traditional contracting.

Therefore, cultural exchange is highly significant in such fields, as it increases cooperation between groups in the long-term and based on the idea that a win-win atmosphere can be of benefit for all stakeholders, such as prime contractors and subcontractors or suppliers; hence, trust is highly important between those parties due to construction projects' high uncertainty.

2.5.1.1 Cultural impact of trust on value

According to Brenkert (1998), high trust between groups or parties reduces transaction cost, allows joint projects of different types, makes people share sensitive information and provides a wider range of ways to expand good relations in business. Moreover, the trust may have an immediate effect on group performance and group work processes. Also, in his research, Dirk (1999) found that high trust between groups will have excellent coordination and superior efficiency. Barney and Hansen (1994) consider that organizations are distinguished by their culture of valuing trustworthiness and believe that this will achieve a positive outcome and strong trust among parties.

We can expect levels of ambiguity and uncertainty in the international business, as parties who are involved in international marketing face different cultures regularly, teams that are geographically distributed, values that change constantly, and new technologies. Therefore, it is vital that routines be understood, as previously, trust was emphasized to depend on the methods being followed, however, the international setting proposes that similarities between parties who are culturally different are not possible (Huemer 2004).

Teams in construction projects are unique as they comprise a complex integration of aspects, and players who are inter-disciplinary with varying responsibilities, roles and targets (Goodman & Chinowsky 1996). Therefore, teamwork is vital, since it includes sharing information, which leads to reduced time delays, less rework and fewer errors; as a result, teamwork increases the collaborative behaviour instead of adversarial relationships, which consequently enhance the trust between participants.

2.5.2 Commitment

Alder (2000) considered three components of commitment rather than types: affective, normative and continuance commitment, where high-level commitment by groups implies a high-value system within the firm. Moreover, people consider culture and its normative qualities throughout values that stand about life and the world.

Many scholars have accepted that culture defines individuals' behaviour. Liu et al. (1996) argued that culture shares an understanding of what is right, reasonable and proper to establish relationships and has behavioural and normative components. Therefore, a subcontractor's strong commitment to a firm can result in behaviour that is more punctual, for example, in getting work done on time, the ability to take up extra efforts outside the

job description or specification, having a flexibility in working hours, being a great team player, having a greater motivation and an ability to develop healthy relationships.

2.5.3 Integrity

Mayer et al. (1995) built an integrative framework concerning organizational trust that considers the features of the role of trust, the trustee and the trustor. This model analyses different characteristics from the existing literature, in which many authors brief that trust is benevolence and integrity, a purpose of trustee's perceived risk and a trustor's tendency to trust. When the liaison between the trustor and trustee starts to improve, the trustor starts to gain information on the trustee's integrity using observation, as well as through other sources, such as the third party.

Integrity has a substantial impact on trust (Luo 2007; Lau & Rowlinson 2009). It is one of the main dimensions of trust, exemplified by when one group protects the welfare of the another group (Hartman 1999; Luo 2007; Lau & Rowlinson 2009). It is a highly crucial dimension of the trust formation if there is little or no information about the trustee's benevolence at the start. When the relationship develops, the interactions between the trustor and the trustee permit the trustor to have more information about the trustee's goodwill and the associated impact accordingly.

Therefore, it is critical to study the relationship development and interactions that are associated with it; thus, in the project life cycle, it is important to find the right approach that helps this relationship to develop as early as possible in a project.

2.5.4 Benevolence

Benevolence is the genuine perceived interest in the service provider (subcontractor) to the customers' (main contractors') welfare away from its egocentric profit motives (Yu et al. 2015). Further, benevolence is when a subcontractor or service provider shows empathy or responsiveness to the customer's concerns and needs (main contractor).

According to Yu et al. (2015), benevolence promotes the ability of a subcontractor to do a job regarding realizing customers' (main contractors') expectations. Hence, it is connected to the main contractor-subcontractor relationship as it lessens the perception of risks and uncertainty (Ba & Pavalou 2002).

2.5.5 Shared values

Shared values are defined according to Morgan and Hunt (1994) as the degree to which participants have beliefs in common about the policies and goals that are crucial or minor, right or wrong and appropriate or inappropriate.

Hence, shared values ease the communication and interaction between participants, and therefore lead to mutual trust. Shared values are one of the most critical factors that influence trust developing between members in any business relationship (Mukherji & Nath 2007). Moreover, it many scholars have argued that customers' perceptions of the value alignment of the service provider's behaviour and policies lead to a higher commitment and superior satisfaction, in addition to greater expectations and confidence about the service provider.

2.6 Risk to trust or trust to risk

Trust should be considered dynamic (Mcdermott, Khalfan & Swan 2005), since it is affected by actions and changes that could damage or reinforce the level of trust where the

condition of risk or the perceived probability of loss can generate opportunities for the trust, which ultimately leads to risk-taking (Karlsen et al. 2008).

It can be seen that trust is diverse in procurement systems, which range from adversarial approaches and contracts towards relationship management and collaboration (Walker & Rowlinson 2008).

Main contractors frequently deal with a lot of unpredictable and fluctuating demand, and they are confronted with uncertainty about the future work and how would they utilize their resources (Usdiken et al. 1988; Eccles 1981).

Therefore, trust is the trustor's choice; a member in the trusting relationship will likely get engaged in this relationship when his rational risks concern other participants within the accepted limits (Laeequddin et al. 2012). Hence, trust building characteristics, for example integrity, credibility, commitment, and emotion, etc. will make the trustor open to the economic or technology risk relationship.

Even though other industries face the same kind of environmental uncertainty, main contractors are unable to avoid market fluctuations or instability created by market creation or the stock market. Therefore, subcontracting is being used as a typical response so that fixed assets can be minimized and increase flexibility (Aditi & Chotibhongs 2005; Winch 1989).

Also, main contractors have a greater ability to utilize their resources by subcontracting at the lowest risk level. On the other hand, subcontracts that are price-oriented reduce costs and, hence, minimize cost risks that are not included in the bid and, as a result, increase the chance of maximizing profit. However, the transactions between subcontractors and main contractors don't occur on the spot in the market, since these operations depend on

progress, timeframe and the quality of the result, while they also have to be within budget. Hence, it is not easy to evaluate the intentions and motives of the subcontractors and the quality of their capabilities, assets and resources (Ngowi & Pienaar 2005).

It is vital to mention that the existence of high institutional systems decreases the risk, and reducing risk builds trust. Therefore, risk managers should evaluate the risks that impact trust building and not build trust without putting in mind the dimensions of risks (Laeequddin et al. 2012).

The willingness to assume risk is "Trust," according to Mayer et al. (1995) while behaviour trust is considering risk. In other words, the fundamental difference between trusting behaviour and trust is actually between "assuming" the risk and being "willing" to take on a risk. The researchers argued that propensity to trust results in risk-taking. Therefore, one has to take a risk in order to get engaged in trusting action. However, as mentioned earlier Moorman et al. (1992) defined trust as the willingness to depend on interchange partner or party who has confidence. Also, Chalker and Loosemore (2016) concluded that once trust is achieved, the trustor can go further in the relationship.

According to Mayer et al. (1995), a person taking a risk influence can be described as separating trust from other situational variables that are crucial to trust, such as "Level of trust" and "Perceived risk." The perceived risk is compared to the level of trust, and if the perceived trust is more than the level of trust, then the trustor will not be involved in a risk-taking relationship (RTR). However, if the level of trust surpasses the level of perceived risk, then the trustor will be included in a risk-taking relationship (RTR) (Mayer et al. 1995).

Thus, according to Sinha et al. (2004), a lack of trust can be considered the main factor that contributes to risks in the supply chain. Scholars and experts describe the trust concept as a mechanism that allows leaders and managers to gain competitiveness and organizational openness while at the same time reducing vulnerability and social uncertainty (Mollering 2004; Laeequddin et al. 2012).

2.6.1 Claims

When it is assumed that a project cost has been increased, a contractor would require additional cost and time due to a number of factors; among these, one of them is the incompetence of the main contractor. However, in most cases, these claims cannot be considered as profitable or straightforward to the main contractor. According to a study from 1995 entitled “Construction procurement by government”, risk events, delays and disputes become more likely when the following occur:

1- Incomplete, inconsistent or unclear project brief
2- Incomplete design at the tender process
3- Estimates are too optimistic
4- Unrealistic objectives
5- Changed objectives during the project
6- The requirements did not match with the plans
7- Lack of coordination in the design phase
8- Inadequate management control
9- Ambiguous risk allocation

Most of the previous lists are related to the pre-construction phase. Early appointment of the main contractor and its subcontractors, for example, can decrease the robustness of the client’s estimates and objectives and increase the main contractor and sub contractor's tender prices, thereby allowing better research and tests through examination of the costs

that are underlined from the start. This can also allow the value engineering process, which may decrease cost overrun and bring the budget on track before starting the execution or construction phase. Moreover, early contractor involvement allows contractors, subcontractors, designers and consultants work together closely, and as a result, build better-coordinated designs that are approved by all main stakeholders.

Also, early contractor involvement allows the joint testing of risks, provides a clear idea how cost can be allocated to avoid issues and aids in reaching an agreement on the actions needed to in order to decrease cost risks. On the other hand, Kumaraswamy (1997) indicated the top ten causes of contractors' claims:

1- Unclear risk allocation
2- Inadequate tender information
3- Uncontrolled external events
4- Not valid contract administration
5- Slow client response
6- Unrealistic time frames
7- Inadequate design information
8- Inadequate site investigation
9- Inaccurate design information
10- Poor communication

Kumaraswamy's identified claims increased the disputes, which external parties need to solve using different methods, such as adjudication, arbitration, mediation or court, if none of the other ways have worked. If the claims went successfully, the client would be liable for additional payments and time, and therefore it would be worth considering.

2.7 Early contractor involvement approach

Contracts and agreements are one of the main factors that impact project stakeholders' relationships, therefore, taking these factors into account is highly important. To shed more light on the process of contract formation in the preconstruction phase, it is also relevant to explore the pros and cons of engaging contractors and subcontractors early in the project before the execution stage. This section will investigate and explore the benefits of involving subcontractors and main contractors at the beginning of a project to build, develop and maintain trusting relationships.

The formation and negotiation of many contracts are based on the principle that the other party cannot be trusted, or that there is always little or no place for flexibility and achieving mutual interest (Smith N.J, 2002). Moreover, there are other limited contracts that force performance by allocating liability irrespectively of the ability to manage risk, rather than facilitating the performance by establishing the agreed procedures and processes that can be implemented effectively (Smith et al. 2006 in Mosey 2009).

Such contracts, such as the "take it or leave it", single stage procedure, do not help the establishment of an integrated team that is fully functional. MacNeil (1976) had expressed concerns about these types of contract in single stage construction contracts when they are one-sided, short and sharp, since they are being created and attract "conflict."

As a matter of fact, lack of trust is not the basis for involving contractors early in a project; rather, it offers a basis to request additional information from the contractors and their subcontractors, and addition, it is harder to make extra changes and create delays.

The Joint Contracts Tribunal (JCT) , for example, can be considered as one of the origins of the standard building contract formats, which are based on a lack of trust. The JCT forms

were based upon the economic and social changes taking place at that time, and were produced in 1931. The forms marked a shift of the power from the client to place extra pressure on contractors and architects to create an acceptable standard form by all parties. Bennet (2000) recognized these types of forms as “safe to be used” and represent the majority view, but he added it is not the best practice.

Banwell (1964) was the first to argue for early contractor engagement. He stated that it is sometimes appropriate to assign the contractor before finalizing the design and agreeing upon a work program, as well as some specialist subcontractors that can help in the design and work as members of the design team.

Mosey (2009), in his book “Early Contractor Involvement in Building Procurement” stated that the idea of contractors being involved and brought into the team had been an interesting choice for many consultants and other stakeholders, however, there are other parties that are still unsure as to whether a contractor or subcontractor should be fully involved or should stay under the processes and procedures of contracts that are designed to transfer risks and maintain the security of the usual practices.

Nevertheless, choosing the contractor before the design is finished can recognize the effort and contribution of the contractor in terms of the design. Banwell (1964) stated that many building contractors could make design techniques and ideas that can enhance design and construction phases that are useful to the project.

The purpose of the preconstruction phase appointment of contractors, subcontractors and suppliers is to gain more contributions for projects. Figure 2 (Two-single pre-construction stage contractor appointment) illustrates the procurement activities included in a two-stage

preconstruction and construction phase contractor selection. The figure also shows the risks that can be reduced and the benefits if contractors engage themselves in a project early.

The benefits are as follows:

1- Subcontractor tender: the main contractor's subcontractors' bids can allow them to absorb project information at the earliest notice. When the clients have already agreed upon this information and their plans have been shown to the main contractors, thereby allowing the subcontractors to show their capabilities, bid their prices and propose their risk/design/other.

2- Subcontractors' appointments: appointing subcontractors at an early stage if agreed that the client can create a higher price and cost certainty, in addition to their commitment.

3- Risks: the prime contractor and its subcontractor's risks' assessments that need to be compared with the client's and consultant's risk assessments and take action according to the agreed upon risk assessments to start work without delays.

4- Costs: cost consultants develop cost plans and test them for the contractors and subcontractors at each stage.

5- Designs: subcontractors and main contractors contribute in the design process to create their affordability and buildability from an early stage.

6- Main Contractor tender: When the main contractor is invited to bid at an early stage, he can propose improvements and absorb less advanced information which makes cost more transparent by pricing the overheads, profits and preconstruction phase. Moreover, it allows clients to have a clear picture of the contractor's risk/design/others, and it shows the customer the main contractor's ability to meet their performance standards.

7- Joint activities: processes, progress, and time can be established by joint consultant/client/contractor activities, such as joint risk management and value engineering, and reaching an agreement on the results of these activities.

8- Program: a program of the construction or execution phase can be approved prior to starting the work on the site that includes dates that are critical and releasing the remaining design by consultants and contractors, in addition to the prices and approval of the total cost estimates.

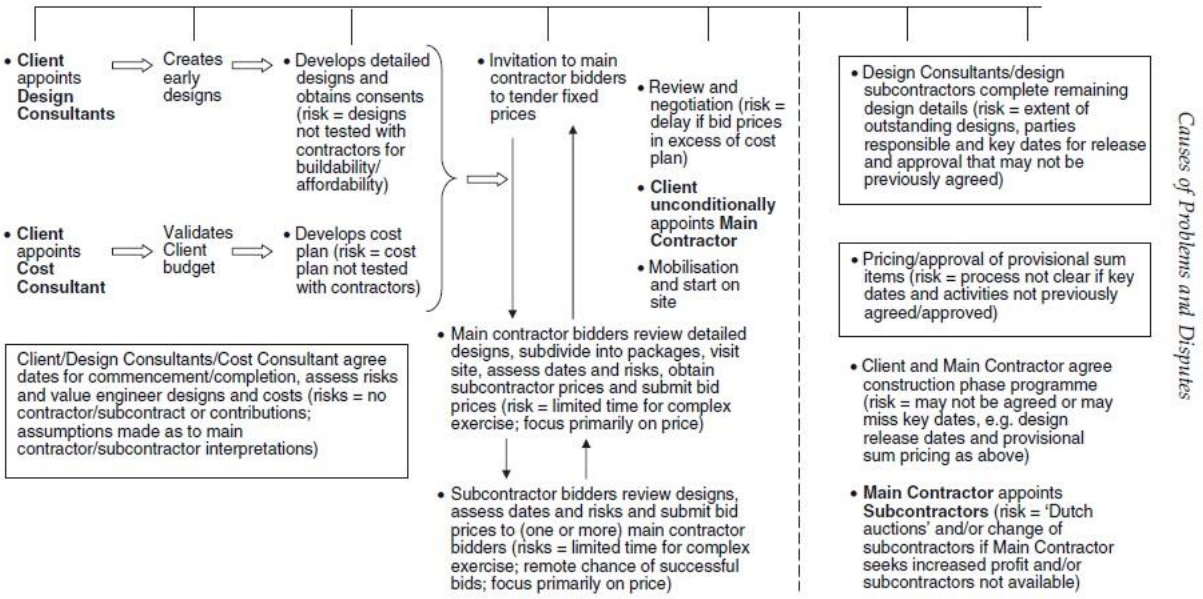


Figure 1 Construction Stage Contractor Appointment (Mosey, 2009)

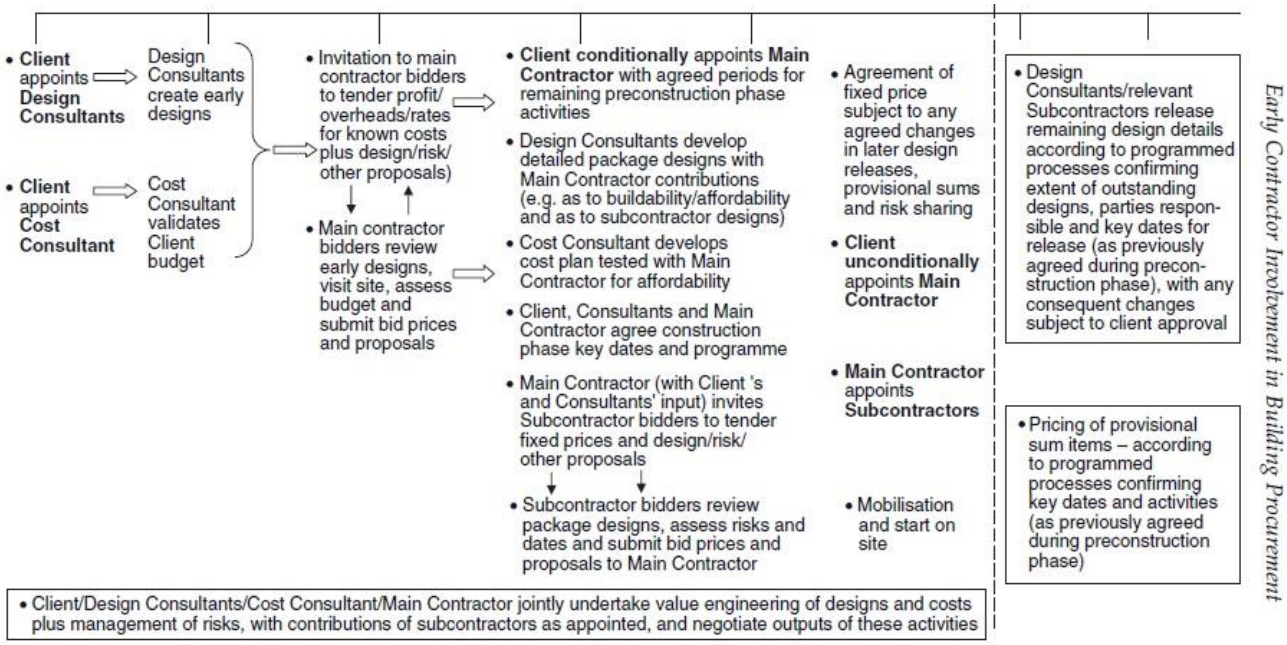


Figure 2 Preconstruction Two-Single stage and Construction Stage Contractor Appointments (Mosey, 2009)

This dissertation argues that the early contractor engagement approach can enhance the trusting relationship between subcontractors and main contractors, in addition to the other crucial factors that impact trust, such as risks, cost, time, program and tender prices. Therefore, early sub-contractor engagement in the initiation and planning stage positively impacts the subcontractors and main contractors' relationship, in that the earliest the contractor is involved the earlier the risk-taking relationship is formed, and more likely the partners (subcontractors and main contractors) will gain high levels of trust.

2.8 Building trust factors

2.8.1 Developing Trust

To get the full picture of trust in the main contractor and subcontractor relationship, we need to understand the mechanism of this vital role in subcontractor selection process. Trust is considered a multidimensional approach; however, it is somewhat elusive in that it is not easy to observe or measure (Bierly & Gallagher 2007; Hartmann & Caerteling 2010; Hanesan & Hess 1997). Therefore, organisational support and leadership are significant in developing these relationships, trust and projects (Smyth & Edkins 2007).

The phase before a relationships' formation between organizations may work as a proxy to trust, whereby partners are repeatedly interacting together and learn about each other, and hence, they become more confident in the decisions and judgment of eachother (Gulati 1995; Hartmann & Caerteling 2010).

Gulati argued that when two exchange partners with prior contact interact, there will be a higher chance of them trusting eachother than two groups who had never formed a

relationship before. He concluded that higher levels of trust develop incrementally with the repetition of economic and social relationships.

Gulati also argued that when the main contractor enters a new relationship, they may face challenges and difficulties in measuring the intention of his subcontractors in terms of performing activities or orders that are critical and somewhat small in size, as well as the subcontractor's capability to do it.

Therefore, the main contractor has to depend on the short-term information available and on the past actions of these potential sub-contractors, which represent their integrity, previous performance and capability. In addition, their reputation, references, certifications and others prove they may already have the support, which is the source of trust (Liu et al. 2006; Hartmann & Caerteling 2010; Ganesan 1994).

Lewicki and Bunker (1995) developed a model that introduces three stages of trust development and suggested that these steps are sequential and linked, instead of being separated into types of trust. The stages are: (CBT) calculus-based trust, (KBT) knowledge-based trust, and (IBT) identification-based trust, the model further suggested that the trustor continues his trust on the trustee in stages according to the three stages:

Stage 1: In professional relationships, CBT is the first stage in the development of interpersonal trust. It is about making sure that the behaviours are consistent and that the participants have to do what they say, since they fear the results of not behaving in that way.

Stage 2: KBT is the second stage of the trust development Lewicki and Bunker's model. It depends on information instead of restriction and develops over time as the participants get

to know each other. Therefore, when information increases, the other person can enhance the predictability, and as a result, interpersonal trust is developed.

Stage 3: IBT is the third step in the development of the interpersonal trust. It depends on understanding eachother's desires and needs. Participants are sure that their interests are going to be secure and little or no supervision of the other is needed.

As identification-based trust develops, members, as a result, understand that they have to keep the other's trust. Hence, increasing identification can let one think like the other and have responses to each other's needs.

However, Doney and Cannon (1997) have developed the somewhat similar integrated trust development model. The theory from different areas suggests determining five cognitive trust-building processes: prediction, calculation, capability, and intentionality. This model process suggests that manufacturing consumers can grow trust on supplier organization.

In the calculation trust-building process, the trustor calculates the benefits and costs of the trustee if he/she acted in an untrustworthy way. However, as the trustor develops confidence they can predict the trustee's behaviour over time. In the capability trust-building process, the trustor examines the trustee's fulfilment of their promises.

Intentionality in a trust building process regards how the trustor reviews the trustee's abilities and motivation. In the transference trust building process, the trustor ensures the use of "proof sources", and then transfers trust to the trustee. This model evaluates the rationale and the characteristics of the trustee to develop trust.

This dissertation argues that these processes (i.e. calculation, prediction, capability, intentionality and transference) can happen in the trust development process and as early as possible in the initiation and planning stages. Moreover, the author debates that trust

between subcontractors and main contractors is developed and built gradually through the project life cycle, and the development and building processes are overlapped. The author also argues that the earlier the development of trust between subcontractors and main contractors the less risk for the project, according to the findings from the literature and observation, therefore, early contractor engagement is significant.

This dissertation also argues that Lewicki and Bunker's three-stage trust development model should be experienced as early as possible, where the calculation, knowledge and identification stages can allow the subcontractors and main contractors to trust each other as early as possible in the initiation and planning stage before signing the contract.

2.8.2 Building Trust

Laeequddin et al. (2012), suggested in their research on trust-building in supply chain partner relationships that parties in the supply chain have to reduce the levels of risk to build trust rather than building trust to lower risk. They also suggested that trust is the result of risk-worthy features, risk-worthy procedures of supply chain members, and risk-worthy rationale.

Furthermore, according to Rahman & Kumaraswamy (2008), clear communication and trust-building are the most crucial skills of leadership in the construction industry. Trust-building strategy in corporate organisations is ranked the fourth most important factor that assesses the integration of project teams, and lack of trust is the major factor that discourages building project teams.

Therefore, the best way to build trust is through trusting individuals (Blois 1999). Many scholars consider trust, as this dissertation highlighted earlier, as one of the major factors

which leads either to the failure or success of a project. McDermott et al. (2007) stated their perception of the understanding of trust in construction projects in their article "Building trust in construction projects", where they interviewed 40 interviewees for different construction sectors and positions. They stated that trust in the construction field is measured by reliance, honest communication and delivery outcomes, and concluded by stating the major factors that contribute towards building trust, the factors that break down trust and the project and organisational factors that impact trust and relationships in the field.

When people trust each other, they rely on each other, on the information that is delivered to get the job done and to the standard they expect. If they act otherwise, then trust cannot be achieved (McDermott et al. 2005). Therefore, since construction projects are complex and the amount of information is extraordinary, everyone has to rely on experience.

Many scholars and practitioners understand that openness and willingness to deliver honest information is crucial for a project's success. McDermott et al. (2007) concluded that clear communication between all parties in construction projects could generate a more efficient outcome when requirements are known earlier in the project and can help ensure a better outcome of the project.

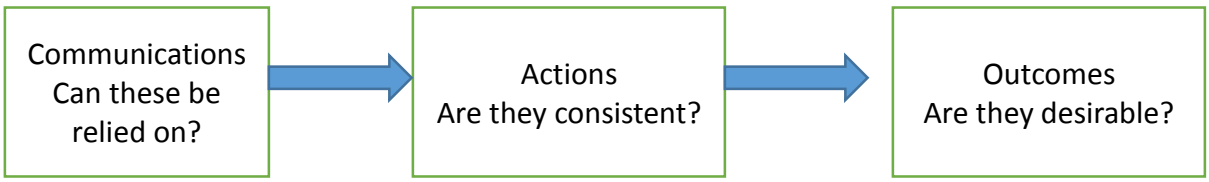


Figure 3. Communication, Reliance, and Outcome (McDermott et al., 2007).

2.8.2.1 Factors that contribute to building trust

There are a number of specific factors that allow trust to be built and enable an efficient working relationship; among them are experience, shared goals, reasonable behaviour, reciprocity and problem-solving.

Basis of trust

- Relationship
- Shared norms and values
- Goodwill
- Reciprocity
- Fairness
- Communication
- Honesty
- Timelessness
- Integrity
- Openness
- Reliability

Building trust factors:

1- Experience
2- Shared goals
3- Reasonable behaviour
4- Reciprocity
5- Problem solving
6- Payment receipt
7- Quality
8- Productivity
9- Openness
10- Fairness

Experience can be gained by working with individuals on an everyday basis, where communication through action and outcome will generate trust; that is, if people prove to each other that they are reliable.

Shared goals is a mutual understanding of projects or work aims, and forming a basis of trust through team building. Also, instead of an individual considering their position as different from the other, shared goals can concentrate these individuals to fulfil a joint task, which will lead to improving communication and mutual understanding, and eventually make other team members appreciate the hard situations or difficulties they might be facing.

Problem-solving is another factor that contributes to building trust in the construction field. The construction industry is unpredictable, and problems can increase and arise, and changes and new information are shared in this type of industry when sharing information and solving problems increase communication and interaction among people, not only when things are going well but also in bad times when things are not going so well.

The last two significant factors that also contribute to building trust are reciprocity and reasonable behaviour. Reciprocity is when teams support and reward each others' trusting attitude. On the other hand, a reciprocal relationship of trust is significant to improving performance and also to reducing charlatan behaviour when commitment and morale are high (Gbadamosi et al. 2007 in Laeequddin et al. 2012). Reasonable behaviour refers to when people work professionally and equitably in the project as teams.

On the other hand, breaking down trust between individuals can appear when a proportion do not fulfil their commitment or obligations to others, which consequently reduces trust, as

mentioned earlier. Moreover, there are other factors that impact trust either positively or negatively, such as company factors, projects factors and contracts.

Factors that impact trust:

1- **Company Factors**:
   - ***1- Company culture***
   - ***2- Financial position of the company***

2- **Project Factors**:
   - ***1- Size of the project***
   - ***2- Scope of the project***
   - ***3- Project's complexity***

3- **Contracts and agreements**:
   - ***1- Contract form***
   - ***2- Fairness of the contract***
   - ***3- Type of the contract: Formal or Informal***

The culture of a company can be considered a factor that impacts trust regarding values that are vital and how people react in the project. The financial position of the company can also impact the trust of the people and ability of the firm to integrate the trusting behaviour.
Also, project factors also can affect trusting behaviour, since every project is different in size, scope and complexity.
Contracts and agreements are other factors that impact trusting behaviour among individuals and organizations, whether main contractors or sub-contractors, since contracts form the basis of the relationship to be built upon.

For instance, scholars such as Xu et al. (2005) and Ling et al. (2014) have found that mutual trust is ranked among the most vital success element for strategic alliances between design firms and contractors. Hence, when trust appears between contracting parties in a project, subcontractors and main contractors will look to achieve better outcomes and solve issues. If there is a lack of trust between these contracting parties, they will be unlikely to participate in relational contracting, and will accordingly experience adversarial behaviour (Rahman & Kumaraswamy 2008).

Relational contracting has many benefits, not just for the client but also to the main contractor and subcontractors, since it has a chance to secure future works. Therefore, keeping a good relationship to maintain a long-term relationship can reduce tendering cost and hence lower transaction cost. However, adversarial contractual relationships were found in traditional contracting because of a lack of trust, according to Doloi (2009, 2013). Examples of relational contracting can appear in alliancing, partnering, joint ventures and Private Public Partnership. First generation partnering can be suitable for the public sector, however, it may not guarantee future work but it may keep the contractor committed to a non-contractual relationship. On the other hand, alliancing can be more suitable for the private sector due to its long-term business relationship. As a result, trust, cooperative and collaborative attitudes, interpersonal attachment and commitment can be achieved from relational contracting towards problem-solving.

Zuppa et al. (2016) also found in their article "Trust perception in the US construction industry" that unit price and lump sum contracts were shown to have no influence on trust between contracting entities. Nevertheless, it was concluded that a cost-plus-fixed fee contract might be perceived to enhance trust among contracting parties. Therefore, it can be

considered that main factors that affect building trust can be found as contract form, the fairness of the contract, and if the contract formal or informal.

2.8.2.2 Other factors that impact building trust

According to Laan et al. (2012), there are contextual conditions that have a well-built impact on trust in construction projects, they have concluded that the most vital factors are the cooperation and competency, therefore, other influential factors on trust:

1- ***Project managers' personal involvement***
2- ***On organizational level expected Future Corporation***
3- ***Competency***
4- ***Payment receipt***
5- ***Risk***
6- ***Past experience***
7- ***Presidents and contractors' perceptions of project-exceeding cooperation***

Table 2 illustrates the most critical factors found in the literature to form a conceptual model to develop, build and maintain trust in a project life cycle that works as a mechanism to reduce risks for subcontractors and main contractors and achieve the mutual benefits for both parties.

S.N.	Precontract factors	Trust development factors	Building trust factors	Other factors that impact trust (Maintaining trust factors)
1	Company factors: 1-Company culture 2-Financial position of the company	Relationship	Experience	Risk
2	Projects' factors: 1-Size of the project 2-Scope of the project 3-Project's complexity	Shared norms and values	Shared goals	Payment receipt
3	Contracts and agreements: 1-Contract form 2-Fairness of the contract 3-Type of the contract: Formal or none formal	Goodwill	Reasonable behaviour	Competency
4		Reciprocity	Reciprocity	Project Manager personal involvement
5		Fairness	Problemm solving	On organizational level expected Future Corporation
6		Communication	Payment receipt	Past experience
7		Honesty	Fairness	Presidents and contractors' perceptions of project-exceeding cooperation.
8		Timelessness	Openness	
9		Integrity	Productivity	
10		Oppenness	Quality	
11		Reliability		

Table 2 Trust Developing, Building and Maintaining Factors

This research has investigated the literature for the factors that impact the main contractor-subcontractor relationships, trust dimensions, approaches and main variables that contribute to rebuilding trust between parties, in addition to the barriers that may affect the trusting relationships, such as claims and disputes.

In the literature review, this research found many definitions for trust as it is stated by many scholars that there is no standard or accepted universal definition of trust, even though there is an agreement of how trust is crucial in a business context. However, this dissertation found Mcdermott et al. (2005) definition to be most suitable for this research context, where they defined trust as "the willingness to rely on others actions, to depend on them, and therefore, be vulnerable to their action, and hence increasing the desire to cooperate." Even though scholars found trust as irrational phenomena which allows contractors to transfer risks to subcontractors due to its transactional nature, other researchers found that trust leads to commitment, coordination, cooperation and collaboration.

This dissertation argues that among the identified factors by Yongtao et al. (2017), that impact the main contractor-subcontractor relationship, trust was found one of the most significant factors as it is considered to be an independent variable where the rest of the 19 identified factors were found to be dependent variables on trust. Moreover, five main trust dimensions were identified, such as: culture, commitment, integrity, benevolence and shared values.

Also, early contractor engagement was introduced as it is one of the main vital approaches that leads to enhancing the main contractor-subcontractor relationship and, in turn, the trust between them. Furthermore, the researchers also identified trust development factors, trust building, and other building trust factors.

2.9 Dissertation discription

Chapter two of the dissertation comprises a literature review relating to identifying and analyzing trust in complex projects consisting of hundreds of contracts. It also discusses the significance of engaging suppliers early in a project and identifying the most crucial factors that influence the subcontractors and main contractors' trusting relationships. Then in chapter three, a conceptual model will be built based on the findings; after that, this dissertation will use the theoretical model to study the impact of trust on the contractor-subcontractor/supplier relationship and the perception of both parties towards each other. Then, a questionnaire will be distributed to some professionals from subcontractors and main contractors to analyze the data collected. After that, this dissertation will show the findings and give conclusion and recommendations for improvements, in addition to their recommendations for further research.

Chapter Three: Conceptual framework

3.1 Introduction

As mentioned earlier, trust is considered by a lot of scholars that it is not easy to study under all type of business contexts to design trust building conceptual models due to its subjective nature. According to Becerra et al. (2001), it is not possible to build a single trust conceptual model and there is no standard definition of trust that can be adopted by all disciplines (Romahn & Hartman 1999). Consequently, the elements of the trust models did not achieve or find a way into the theoretical frameworks (Luhmann 1979; Kramer 1999; McAllister 1995; Lewis & Weigert 1985).

However, since a project is a temporary end over, which has a start and end, this dissertation will explore the mechanisms and dynamics of rebuilding trust (building, developing and redeveloping) strategy throughout complex projects in the United Arab Emirates. From the initiation and planning stages (Early Contractor Involvement) and (trust development), the execution stage, monitoring and controlling stages (trust building) to the closing stage (maintaining trust).

Moreover, this dissertation is going to construct a conceptual model built from the existing literature and using the factors found most critical in impacting trust between subcontractors and main contractors.

3.2 Trust in project life cycle

According to Zand (1972), trust is described as a gradual and self-reinforcing phenomenon. Moreover, trust is not isolated incident, it is built up, and building it can take place

throughout a project or many projects over time (McDermott et al. 2007); however, trust also can be broken down in some cases and rebuilding it might be difficult.

Based on the literature and findings, this dissertation has developed a trust-building, developing and redeveloping strategy model. Figure 4 illustrates the current practice in construction projects and figure 5 illustrates early contractor involvement in a project (initiation and planning stages). Trust will start to develop between the actors through the start of the execution stage, and then the trust development process will overlap gradually with the trust-building process. Since most critical interactions between subcontractors and main contractors occur in the implementation and monitoring and controlling stages, the trust building process is considered the most important process that speculates the relationship of both parties. Hence, maintaining the trust process will start its development at the end of the monitoring and controlling stage to the closing stage, bearing in mind if the main contractor's and subcontractor's trusting relationship has succeeded to the end of the project.

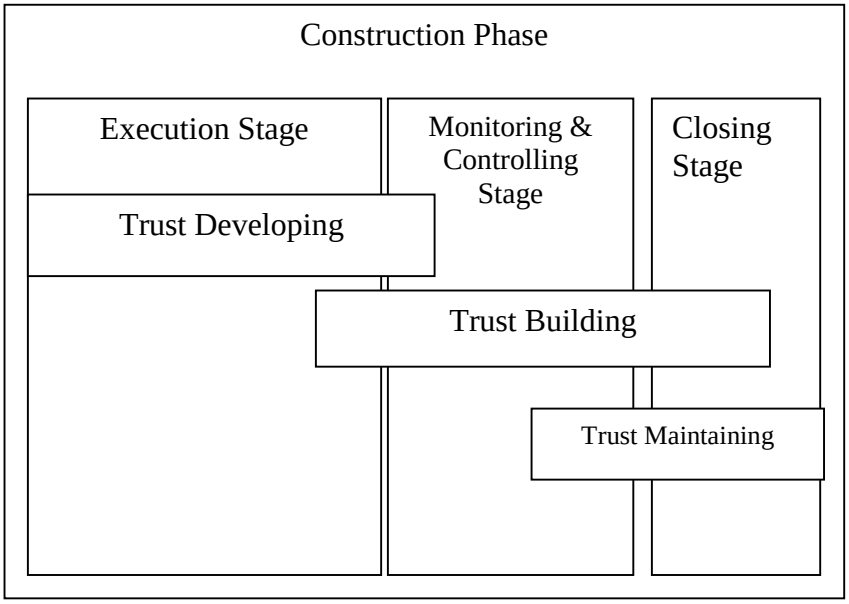


Figure 4 Initial assumption of trust process in the construction phase

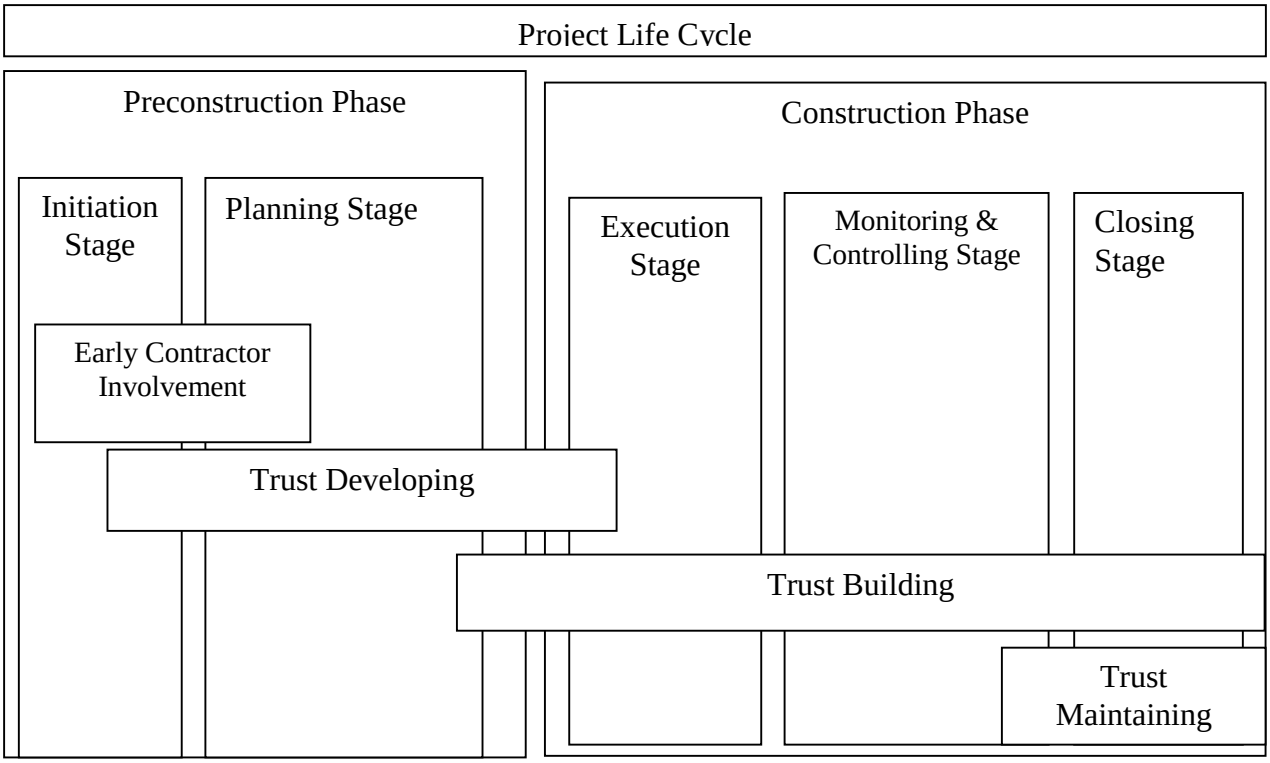


Figure 5 Rebuilding trust (Developing, Building and maintaining trust) in a project life cycle Strategy Model (Source: The Author)

3.3 Conceptual framework

Almost, if not most, of the literature trust models, have considered trust as a one-dimensional phenomenon concentrating on trust building variables, such as integrity, honesty, brand image, ability, etc.). Due to the complexity of the construction field, this dissertation is going to consider trust as a multidimensional phenomenon and concentrate on factors that impact developing, building and maintaining the trust through the project life cycle, as shown in figure 5.

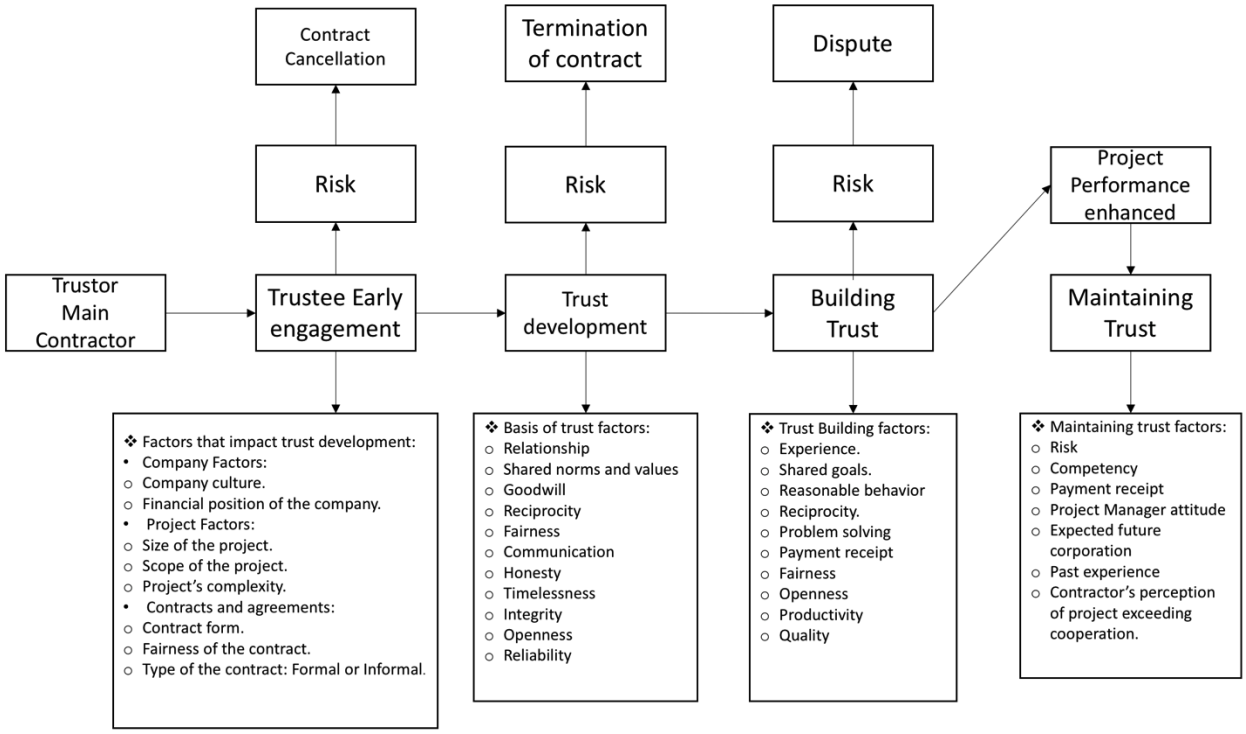


Figure 6 Rebuilding trust (Development, Building and Maintaining trust) conceptual model (Source: The Author)

3.3.2 Discussion

In the integrated conceptual model, illustrated in figure 6, there are important points to be addressed, such as the significance of the subcontractor's early engagement approach, and the link between risk and associated factors of each trust process in the project life cycle. There are several important factors that subcontractors and main contractors look for before engaging early in the project illustrated in figure 6, such as the company factors, project factors, contract and agreement draft. If these factors have been met for both parties, then it is more likely they will be engaged early in the project.

At the beginning of the interactions, subcontractors and main contractors may lack mutual information, and they may be in a total unawareness of the upcoming result or delivery

outcome of the relationship, so there might be no or little trust, and risk is high for both partners.

Also, as mentioned earlier, risk assessment is one of the main influences to engage main contractors with subcontractors early in a project to assess each others risks prior the start of the execution stage. These risks can appear in cost, design, and safety. Then, these assessments are compared with clients evaluations, and actions can be taken accordingly, where they have the chance to either withdraw from the project or continue the project and start to form the trusting relationship.

Therefore, parties who have interacted together will have more opportunity to establish a trusting relationship than parties who have never been interacted. When they interact together in the initiation and planning stages, they might face difficulties and challenges, and if they could pass these problems, the chance is higher to maintain such a trusting relationship in the coming stages. Hence, the opportunity to avoid such challenges is great if they interacted early in the preconstruction phase rather than construction phase, please see figure 4 and 5.

The early contractors' engagement in the preconstruction phase can be considered as before the relationship formation phase, which works as a proxy to trust, as mentioned earlier. Partners may repeatedly interact together and learn more about each other and their expectations to each other, and accordingly, they become more confident in making decisions and judgments of each other in the trust development processes. Where calculation, knowledge and identification stages occur, and parties have the chance to test their relationship, shared norms and values, goodwill, reciprocity, fairness, communication, honesty, timelessness, integrity, openness and reliability. Moreover, the risk will be less

than the prior of the beginning of the relationship. If the parties found that the cost is more than the benefit, then subcontractors can decide to withdraw from the project, and the main contractor may have the right to terminate the contract with the subcontractor. If all goes well, however, the parties will then be ready to enter the trust-building process.

In the trust-building process, the trusting parties are have a greater confidence in each other. However, there are critical factors that contribute to building trust, such as experience, shared goals, reasonable behaviour, reciprocity, problem-solving, payment receipt, fairness, openness, productivity and quality. These factors were found most critical in such a phase, according to the literature and expert judgment.

Delivery outcomes can be considered the most crucial factor in building the trust process. Parties can experience each other in the execution and monitoring and control stages in the project life cycle; therefore, according to figure 5, building the trust process is overlapped between planning stage to the monitoring and controlling stage because most interactions, actions and reactions occur in those stages.

As mentioned earlier, the difference between behaving in trust and trusting the other individual is actually the “assumption” of risk and a “willingness” to assume a risk. In other words, many scholars and practitioners have found that lack of trust is the main factor that contributes to risks in the supply chain. Therefore, and according to figure 6, it suggests that if the trusting partners have not met the factors mentioned, the risks may result and issues may appear, and in this case, partners may go for dispute. Otherwise, if the factors are achieved and the trusting partners succeeded in building trust, project performance regarding cost, time and quality will be enhanced, and trust can be maintained at the closing stage of the project life cycle.

To maintain trust between the subcontractors and main contractors, the following factors have to be taken into account, such as risk, competency, payment receipt, project manager attitude, expected future corporation and experience.

This research has identified three hypotheses:

1- Hypothesis 1: (H0): There is a significant impact of trust on the main contractors and subcontractor relationship.

2- Hypothesis 2: (H0): Early contractor engagement in the initiation and planning stage positively impacts the main contractors and subcontractor relationship.

3- Hypothesis 3: (H0): The higher the level of trust between the subcontractors and main contractors, the better the project performance.

In chapter four, this author tests the conceptual model, as shown in figure 6, and studies the impact of trust on the main contractor-subcontractor relationships and the perception of both groups towards each other; then, a questionnaire will be distributed using different methods and techniques to analyze the data collected. After that, this research will show the findings and give conclusions and recommendations to improve the main contractor-subcontractor relationships in the Middle East, in addition to the recommendations for further studies.

4 Chapter Four: Research Methodology

4.1 Introduction

This chapter is going to discuss the research method used, such as the research design, population, data collection, sample, questionnaire design and content, pilot study, data analysis process, validity and reliability of the research and ethical considerations.

4.1.1 Research Objectives

To explore the strategy, the researcher employed the process and conceptual model illustrated in figure 4, 5 and 6 respectively, and analyzed the research questions proposed in chapter 1 which are:

1- Investigate the literature on the relationship between the subcontractors and main contractors.
2- Develop an approach to rebuilding trust effectively (develop, build and maintain) between subcontractors and main contractors throughout the project life cycle.
3- To examine the main contractor and subcontractor perceptions towards each other to form a trusting relationship.
4- Identify the main factors that affect the relationships between subcontractors and main contractors.
5- Define the main factors that contribute to rebuilding (develop, build and maintain) trust between subcontractors and main contractors during a crisis.
6- Suggest improvements to enhance the main contractors' and subcontractors trusting relationships.

Also, this research investigates the crucial role of early contractor engagement in a project and forms a link between rebuilding trust (developing, building and maintaining trust) and enhancing the main contractor and subcontractor relationships. To what extent can early contractor engagement improve the trusting relationship between subcontractors and main

contractors? Further, what is its corresponding influence for both parties? What are the main factors that impact trust between subcontractors and main contractors from the initiation to the closing stage in a project? And does project performance enhancement guarantee trust between the participants?

4.1.2 Hypotheses development

The study proceeds the following hypotheses:

1- Hypothesis 1: (H0): There is a significant impact of trust on the main contractors and subcontractor relationship.
2- Hypothesis 2: (H0): Early sub-contractor engagement in the initiation and planning stage positively impacts the main contractor and subcontractor relationship.
3- Hypothesis 3: (H0): The higher the level of trust between the subcontractors and main contractors, the better the project performance.

4.2 Research Design

This dissertation started in April 2016 and ended in August 2017. The first chapter of this dissertation focused on the background of the importance of trust between stakeholders in construction projects, in addition to defining the main problem of the dissertation, aim, objectives and scope of the dissertation.

The second chapter gives a comprehensive literature review of the main contractor-subcontractor trusting relationship. Identified the main factors that impact trust between the main contractor and subcontractor relationships. Identified and analyzed trust in complex projects consisting of hundreds of contracts. The significance of engaging sub-contractors early in a project. Defined the main factors that contribute to rebuilding trust (Develop, build and maintain trust) between subcontractors and main contractors during a financial

crisis, and the risks associated with these trusting relationships; also, it investigated the literature for approaches that enhance the main contractor-subcontractor relationship during the project life cycle.

Chapter three demonstrates a strategic model to suggest a solution to the problem; then, a framework was constructed based on the findings in chapter two.

Chapter four is going to discuss the research method to be used, such as the research design, population, data collection, sample, questionnaire design and content, pilot study, data analysis process, the reliability of research and ethical considerations. A quantitative method using a questionnaire was the main research approach to collecting the data. Then the survey was distributed and shared by some of the professionals from the main contracting and subcontracting firms and posted online using online platforms, such as LinkedIn and others, to analyze the data collected.

Chapter five analyzes the findings of the questionnaires using quantitative research methods.

Chapter six suggests improvements to enhance the main contractors' and subcontractors' trusting relationship in Dubai and the UAE and to give a conclusion and recommendation, in addition to the recommendation for further research. Figure 7 illustrates the research process below.

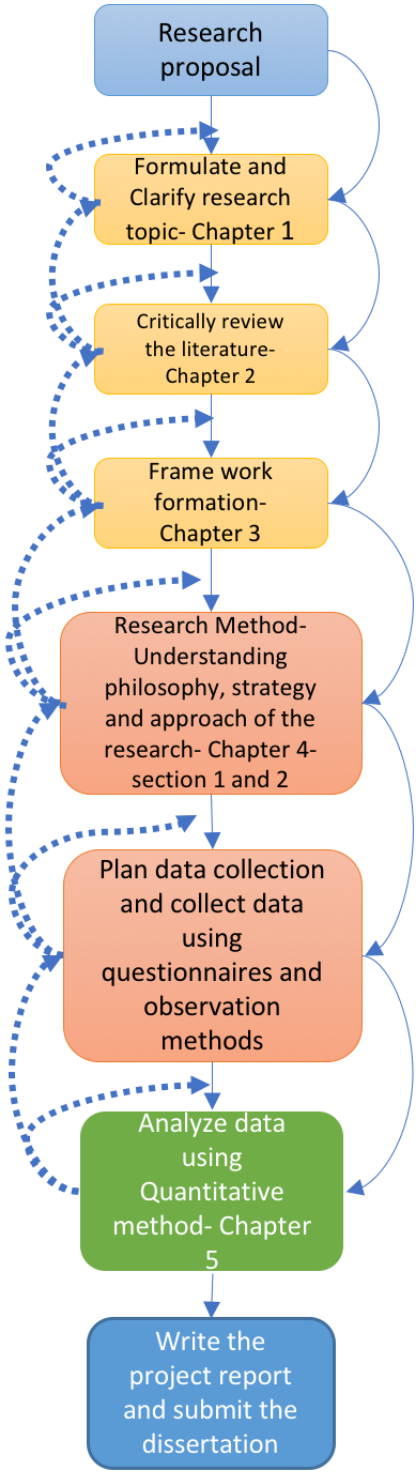


Figure 7 The research process (Saunders et al., 2012)

Quantitative research is chosen to be the research approach where quantitative research is usually associated with a deductive approach, since the focus is on using data to test a theory. However, it can also be used as an inductive approach to developing a theory using the data collected (Saunders et al. 2012).

This research examines the relationships between the subcontractors and main contractors according to the relationship variables, as illustrated earlier in Table 1, where trust is considered as the independent variable and the rest of the main contractors' and subcontractors' relationships factors are considered dependent variables. This research also examines the relationship of early contractors' engagement elements, the trust development factors, building trust factors and maintaining trust factors, as illustrated in Figure 6. Then, these variables are calculated numerically and analyzed using the statistical technique (SPSS) to ensure the validity and reliability of the data collected.

The strategy of this quantitative research is a survey research strategy, where two questionnaires were conducted targeting main contractors' and subcontractors' professionals' perspectives, such as construction managers, project managers, commercial managers, managing directors and general managers. Professionals were approached through an online questionnaire sent as an email to participants and published online through online platforms, such as Linkedin and others. Also, paper questionnaires were given to participants at their projects in the United Arab Emirates.

Survey participants approach methods:

1- Posting online survey using online platforms.

2- Selecting the main contracting and subcontracting firms' professionals and sending them invitation emails.

3- Distributing a printed questionnaire in the professionals' work place.

LinkedIn is an online platform that provides an employment-oriented social networking service founded in 2002. A professional networking site, LinkedIn includes employers and employees from all over the world. The website includes more than 470 million professionals. In the United Arab Emirates itself, there are more than two million members. Figure 9 shows the registered members all over the world.

Figure 8 Linkedin registered members all over the world according to Linkedin website: https://press.linkedin.com/about-linkedin?

Main Reasons to use online survey:

1- It has an excellent opportunity to reach a greater number of participants, hence, receiving a greater perspective. Many participants can be approached from all the emirates,

making it easier for the researcher and the professionals, who are busy with their deadlines.

2- The speed, efficiency and accessibility that this type of questionnaire can provide.

3- The online survey provides approach to a enormous number of participants, which enables an empirical analysis to study the strength and nature of the hypothesized relationship between main contractor/subcontractor trusting relationships and project performance.

4- The online survey can provide a better sample that includes scope and scale to allow statistical analysis than interviews and having a case study.

4.3 Research Population

The researcher has approached professionals working in main contracting and subcontracting firms, such as construction managers, project managers, commercial managers, managing directors and general managers using main contractor and subcontractor databases. Subcontractors were selected from different main contractor databases where main contractors were approached by contacting different managers, such as project managers, operation managers and general managers through emails and later through telephone conversations using the following strategy to help gain access:

1- Possible benefits to the organization of granting access were identified.

2- Clear account of the purpose of the research and type of access required was provided.

3- Familiarity with the organization before making the contact was ensured.

4- Overcoming the organizational concerns about granting access.

According to the department of economic development in UAE, there are six categories of main contracting firms. These classes are classified according to the capacity of the firm, capital, the number of employees and engineers, experience, projects executed, quality, health, safety and HSE requirements.

Hence, this research targets main contracting firms that are (Category 1), whose value of capitals and assets 30 M AED or above. On the other hand, there is no particular category for subcontracting firms. The subcontractors' population was approached from different fields, such as mechanical electrical and plumbing (MEP), joinery, decoration, aluminum, masonry works, carpentry works, and lifts, etc. The number of (category 1) main contracting firms in UAE is 250 and number of subcontracting companies are 500.

4.4 Sampling

Sampling is defined as a part of the total presented population (Fellows & Liu 1997). Also, the researchers stated that there are different approaches to finding the sample size of research, such as imitating a sample size of similar studies, conducting a census on a small population and using formulas to calculate a sample size.

Saunders et al. (2012) classified sampling into two categories: probability sampling and non-probability sampling. Probability sampling includes different techniques, such as simple random, systematic random, stratified random and random cluster. Where non-probability sampling techniques include quota, purposive, volunteer and haphazard.

In some research questions, it is sometimes possible to collect data from the entire population as it may be of a reasonable size. However, the census may not be useful as it may not provide useful results as compared to collecting data from the sample, which represents the entire population according to Saunders et al. (2012). Hence, this dissertation emphasises the following:

1- Time constraints may prevent the researcher from surveying the entire population.
2- Budget constraints may impede the researcher from studying the whole population.
3- It may not be practical for the researcher to survey the entire population.

This research has used the Kish (1965) equation to determine the sample size of the main contractor and subcontractor population as per the following:

$$n = \frac{n'}{1 + \frac{n'}{N}}$$

The definitions of all variables are as per the following:

n' = the infinite population of the sample size which can be calculated from n' = S2/V2

N: Total population (250 contractors and 500 subcontractors)

n: The sample size

S2: Standard error variance of population elements, S2= P (1-P); maximum at P= 0.5

V: 0.05 sample population standard error for the confidence level 95%

T = 1.96

Sample size calculation:

n (contractors) = 100/1+(100/250) = 72

n (subcontractors) = 100/1+(100/500) = 84

The questionnaire was distributed to 135 main contracting firm participants and 85 subcontracting firm participants to overcome the probability of a lower response rate in addition to the online platforms, hence, the results and response rates are presented in Table 3.

Population	Total Population	Sample Size	Questionnaire distributed	Respondents number	Response Rate
Main Contractors	250	72	135	41	**30.4%**
Subcontractors	500	84	85	20	**23.5%**

Table 3 Response rate and sample size of the populations

Non-probability sampling is used to sample employees from the construction sector. The questionnaire was posted in professional online platforms; however, one of the online survey limitations is the difficulty in making sure that it can be completed by the targeted sample. The participants' response is adequate and sufficient (Loosemore 2016). Hence, participants were contacted by telephone conversations and email invitations were sent to more than 135 potential participants from main contracting firms and 85 potential participants from subcontracting firms, which resulted in 41 actual responses from main contracting companies and 20 responses from subcontracting firms, see Table 3. Which is lower than the expected response rate of 34.6% provided by Cook, Heath and Thompson (2000).

Moser and Kalton (1971) showed that less than 30% response rate is expected to yield outcome based on non-response bias. Based on this, the achieved response rates of 30.4% and 23.5% are reasonable.

4.5 Questionnaire design

Rather than open questions, the questionnaire was built to be closed questions and answered by using several responses' types, such as single ranked responses and multiple

responses. It was useful for participants to rank the options given to him/her by numbering them in order from the minimum to the maximum number. This ensures that the problems illustrated would not happen and, this minimizes the importance of the statistical outliers. In order to prompt the participants to elaborate in case any of the themes were found in the survey, a free text box was incorporated at the end of some questions since the quantitative information gathered may shortage potential "richness", according to Boynton and Greenhalgh 2004) and Burgess (2001).

It is noted that each option given to the participant has to be coded as an independent variable, which allows the researcher to generate more data. However, the number of options should not be excessive. Rated responses were also used in this questionnaire. Rated responses is a common approach in the social sciences where Likert scales are employed in such questions.

The questionnaire was refined using some subcontractors' and main contractors' firms, and it was pilot tested to collect feedback from some colleagues and co-workers. In addition to the empirical hypothesis test, the focus was on the two perspectives: the subcontractor's perspective (Tier 2) and the main contractor's perspective (Tier 1). Moreover, the questionnaire also identified the participants' projects' size that is varied from less than 40 M AED to more than 200 M AED to have more insights about the complexity of the subcontractors' and main contractors' scope.

4.5.1 Questionnaire structure:

Section 1: Contains general information about the respondents, their organizations and projects such as industry field, experience, position, company classification, the location of the firm and project value in AED, see Table 4.

Section 2: The objective of this section is to assess the subcontractors and main contractors' relationship and the level of trust between them as per the following:

1- The importance of trust in their relationships.
2- The extent to which both parties trust each other.
3- Barriers towards these relationships, such as sharing information, payment receipt, productivity, risk and termination of the contract.
4- The perception of the parties towards each other was addressed, see table 5.

Section 3: The objective of this section is to explore the following:

1- The most important factors found in the literature that contribute to developing, building, and rebuilding trusting relationships between subcontractors and main contractors.
2- The early contractor engagement approach.
3- The assessment of both parties' perception towards each other.
4- Stage or stages that the main contractor and a subcontractor relationship may develop and build within the project life cycle.
5- The testing reaction of both parties when risks occur.
6- The examination of the impact of the main contractor and subcontractor relationships on project performance. See Table 6 and Table 7.

Section 1

S.N.	Factors	Description
	Industry field	Type of the construction industry – whether Main contractor, subcontractor or supplier
	Experience	Working experience (years) of the person filling out the questionnaire.
	Position	Position of the person filling the questionnaire.
	Company classification	Classification of the main contractor or subcontractor – whether category 1, 2, 3 or less.
	Location of the company	Location of the company – whether in UAE, Saudi Arabia, Qatar or other parts of the Middle East.
	Project worth	The value of the project that indicates or gives an idea of the size of the project.

Table 4 General information criteria

Section 2

S.N.	Factors	Description
	Open Communication	Whether the subcontractors and main contractors interact with each other effectively through formal and informal communication channels.
	Company culture	Whether the main contractors' and subcontractors' culture and cognition are consistent to each other.
	Information sharing	Sharing important information about the project, such as cost and technical information.
	Long business relationship	Whether the main contractor and subcontractor cross the same long business orientation goal.
	Mutual trust	The trust perception of both parties towards each other.

	Effective coordination	Coordinate and plan a project's activities effectively and in an adequate manner.
	Early involvement of subcontractors	Involving subcontractors in the project initiation and planning stage.
	Risk sharing	To share responsibilities of opportunities and issues.
	Delay of payment to the subcontractors	Exceeding the time limit for paying the interim payments to subcontractors.
	Attitude to the subcontractors	Communicating with subcontractor with respect.

Table 5 Relationship assessment factors

Section 3- Part 1

S.N.	Factors	Description
	Relationship	Description of the relationship, such as adversarial, cooperative, collaborative or partnering.
	Shared norms and values	Ethical and technical values that parties are adhering to.
	Goodwill	Good and positive attitude of participants.
	Reciprocity	Defining participant's informal exchange of labor and goods.
	Fairness	Fairness while creating the contract and when participants deal with each other.
	Communication	Whether the subcontractors and main contractors interact with each other effectively through formal and informal communication channels.
	Honesty	Frankness, sincerity and truthfulness between participants.
	Timelessness	Fast response to achieve certain activity in a project.
	Integrity	To show a strict sense of honesty and moral principles.

	Oppenness	To be opened to new ideas and change.
	Reliability	To be able to depend on each other to achieve good performance.

Table 6 Trust development factors

Section 3-Part 2

	Factors	Description
	Experience	Number of years that main contractors or subcontractors are doing business
	Shared goals	Shared ambitions and targets need to be achieved
	Reasonable behaviour	
	Reciprocity	Defining participant's informal exchange of labor and goods
	Problemm solving	How subcontractors and main contractors can be opened to solve technical problems together
	Payment receipt	Receiving payments on time and according to the certified payments.
	Fairness	Fairness and equity of the conditions of contract.
	Openness	Openness to new ideas and solutions to problems.
	Productivity	Whether subcontractors can deliver the work and achieve targets and assignments within the scheduled time and according to the progress plan.
	Quality	How the quality can be improved.

Table 7 Trust building factors

The factors that impact the main contractors' and subcontractors' relationships were identified in the literature review will help in answering the research questions to rank the most crucial factors that influence trust between the main contracting and subcontracting firms in complex construction projects. Moreover, to suggest improvements and

recommendations that enhance the trusting relationships between subcontractors and main contractors.

A cover letter that explains the purpose of the study will be provided in the questionnaire, responding criteria, and the aim and objectives were also discussed, in addition to the confidentiality of the survey to encourage a higher response. Then, the questionnaires (Attached in Appendix 1) will be distributed and posted on online platforms to the subcontractors and main contractors in the English language, since it is most used and more appropriate in such businesses in the United Arab Emirates and Gulf region.

4.6 Validity and reliability of the research

In order to measure the validity of the reliability of the questionnaire, the researcher employed statistical methods. In order to examine the validity of the questionnaire, the structural validity of the whole questionnaire and the validity of each field were tested. By measuring the Pearson's correlation coefficient between one field of factors, such as (factors that impact subcontractors and main contractors' relationship) and other 3 fields of factors, such as factors that impact early contractor engagement in a project, factors that impact trust development between subcontractors and main contractors and the factors that impact trust building between subcontractors and main contractors.

On the other hand, in order to measure the reliability of the questionnaire, the researcher used Cronbach's Coefficient Alpha method.

4.6.1 Validity of the research (Using Pearson's Correlation Coefficient in SPSS)

In order to test the validity of the questionnaire, the researcher used Pearson's correlation coefficient through SPSS. The following steps were implemented:

1- Decide to use One-Tailed or Two-Tailed test;

A- One-Tailed: If there is a priority, the hypothesis is to sign (- or +) the correlation.

B- Two-Tailed: If there is no priority.

2- Calculate the Degree of Freedom (DF) = (Sample size – 2) or (N – 2) which (62 – 2) = 60

3- Find the DF in the Table, please see Appendix 3 (Table 35).

4- Read across the row of values left side to right side until a value greater that calculated r is found.

5- The P-Value will at the top of the first column to the left:
In this questionnaire the DF = 60 so r (Pearson's Correlation Coefficient) = 0.25 using Table 35 in Appendix 3, so r (Table) = 0.25 at 0.05 P-Value (Level of significance).

6- If r > r Table, then the field of variables can be considered valid and if r < r Table then field of variables can be considered not valid, see Table 8.

S.N.	Items/Field of Variables	Pearson's Correlation Coefficient	Validity
1	Factors that impact main contractors' and subcontractors' relationship	0.760>0.25	Valid
2	Factors that impact early contractor engagement in a project	0.649>0.25	Valid
3	Factors that impact trust development between subcontractors and main contractors	0.689>0.25	Valid
4	Factors that impact trust building between subcontractors and main contractors	0.513>0.25	Valid

Table 8 Correlations between forms using SPSS

4.6.2 Reliability of the research (Cronbach Coefficient Alpha)

Stability, consistency and dependability are equal to reliability (Polit & Hunger, 1985). They stated that the less variation a tool creates in frequent capacities of an attribute, the greater its reliability. The test is repeated on two occasions on the same people which is then compared marks achieved by calculating the reliability coefficient.

Cronbach Coefficient Alpha method has been used to calculate the reliability of the questionnaire of four primary fields of factors that impact trusting relationships between subcontractors and main contractors and the whole fields of the survey.

Cronbach's alpha: $\alpha = \frac{N \cdot c}{v+(N-1).c}$

N = Items number.

C= The inter-item average covariance among the items.

V= The average variance.

S.N.	Section	# of items/factors	Cronbach's Coefficient Alpha
1	Factors that impact main contractors' and subcontractors' relationship	10	0.870
2	Factors that impact early contractor engagement in a project	5	0.846
3	Factors that impact trust development between subcontractors and main contractors	10	0.897
4	Factors that impact trust building between subcontractors and main contractors	6	0.813
Total		**31**	**0.930**

Table 9 Cronbach's Coefficient Alpha using SPSS

The formula illustrated above indicates that the Cronbach's Alpha increases with the rising number of elements. If the average inter-item correlation is low, the Cronbach's Alpha will also be low.

0 to 1.0 is the average range of Cronbach's coefficient Alpha. Hence, greater values mean greater internal steadiness. Table 9, shows that Cronbach's Coefficient Alpha is calculated for the four field of factors and results were in the range from 0.813 to 0.897, where these varieties are considered high, which ensures the reliability of the questionnaire.

4.7 Ethical consideration

Ethics are referred to the behaviour standards that guide researching with the relation of the rights of those who are going to become or became the subject of the research work (Saunders et al. 2012).

The following ethical principles were taken into considerations:

1- Integrity and objectivity of the researcher
2- Avoidance of harm (nonmaleficence)
3- Respect of others
4- Privacy of those taking part
5- Ensuring data confidentiality and anonymity maintenance of those involved
6- Voluntary nature of participants and right to withdraw
7- Compliance of managing the data
8- Responsibility in the data analysis findings reporting

Therefore, the participants were assured confidentiality and anonymity from the subcontractors and main contractors' firms, where they were also informed that the questionnaire was purely for academic purposes.

Chapter five: Data Analysis and Findings

5.1 Introduction

This chapter analyzes the survey results and discusses the questionnaire sections (1, 2, 3 and 4), respectively. Section (1) presents the general information about the respondents, their companies and their projects. Section (2) assesses the main contractors' and subcontractors' relationship and the level of trust available to them in the construction field, the importance of trust in such relationships and the barriers that impact such relationships. Section (3) examines the most crucial factors found in the literature that contribute to developing, building, and maintaining trust between involved parties. Section (4) tests the null hypotheses using One-Way ANOVA, and the early contractor involvement approach and its impact on the enhancement of the main contractors' and subcontractors' relationships and perception of the both sides towards each other, in addition to its impact on project performance.

5.1.1 Data processing

Data were sorted and coded after collecting them from the questionnaires, and then they were entered and checked using computer software, such as Microsoft Excel and SPSS. After that, these data were entered and imported using the above-mentioned software, and a similar method was used for formatting and coding data.

Nominal, scale and ordinal scale were each applied in the process of the analysis. The ordinal scale is a rating scale for data that uses integers in descending or ascending order. RII (Relative Importance Index) was also employed in the study.

The Relative Importance Index (RII) is being widely used in researches, especially in the project management and construction management studies for calculating the attitudes of respondents towards variables illustrated in the questionnaires (Chung et al. 2003; Enshassi et al. 2007; Alinaitwe et al. 2007).

Variables, on the other hand, have a specific measurement level and unique titles. Although it is vital to determine the type of analysis that will be conducted – whether in ascending or descending order – such as nominal, ordinal, interval and ratio. For example, in SPSS, the levels of ratio and intervals are grouped together and called scale.

To make it easy for data analysis and handling, values such as variables can be designed by numeric codes, even if the variable is one, such as the way gender can take the value of male or female. However, it would either be coded as 0 or 1.

5.2 Analysis

The response rate of subcontractors, which is 23.5%, can be considered quite small and results in a work load that participants have in this field. Paper questionnaires were handed over face to face to the participants to ensure an adequate number of participants as much as possible.

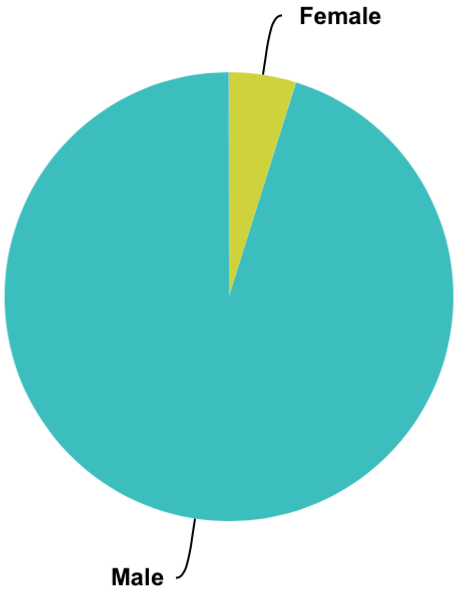
The majority of the participants were managers and directors in their fields. This sample structure in the questionnaire has provided the study with confidence that the participants experienced and dealt with such issues between the subcontractors and main contractors.

5.2.1 General Information about subcontractors and main contractors

This section contains seven questions that seek answers to the respondents, such as their genders, fields in construction projects, company classification, the location of the project, the role of the respondents, years of experience in their firms, and project value.

5.2.1.1 Gender of respondents

Figure 10 shows the main contractors and subcontractor respondent's number and percentage genders. The figure shows that 95.16% of respondents are males whereas only 4.84% are females.

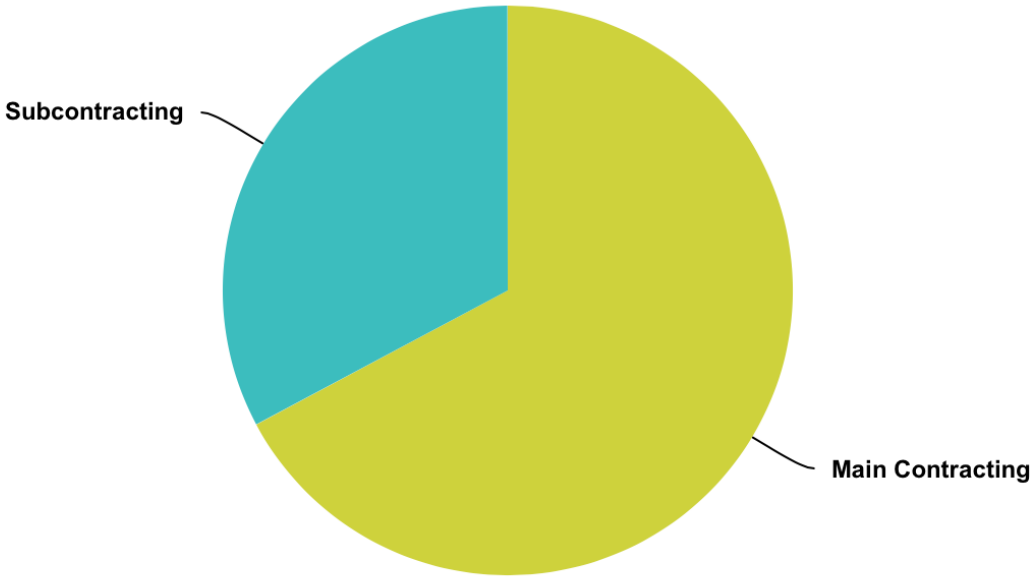


Answer Choices	Responses	
Female	**4.84%**	3
Male	**95.16%**	59
Total		62

Figure 9 Respondents gender

5.2.1.2 Construction Industry field

Figure 11 indicates that the construction industry field respondents comprised 67.21% of respondents working in main contracting firms and 32.79% working in subcontracting companies.

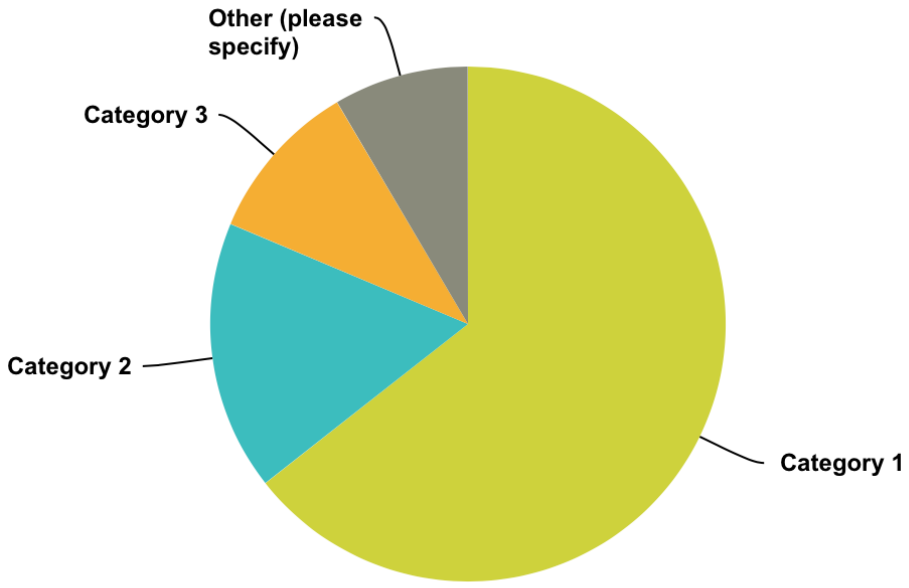


Answer Choices	Responses	
Main Contracting	**67.21%**	41
Subcontracting	**32.79%**	20
Total		61

Figure 10 Construction industry field of respondents

5.2.1.3 Companies classifications

Figure 12 shows that 64.41% of respondents' companies are classified as category 1, 16.95% of respondents' companies are classified as category 2, 10.17% of respondents' companies are classified as category 3, and 8.47% of respondents companies are from different classifications.



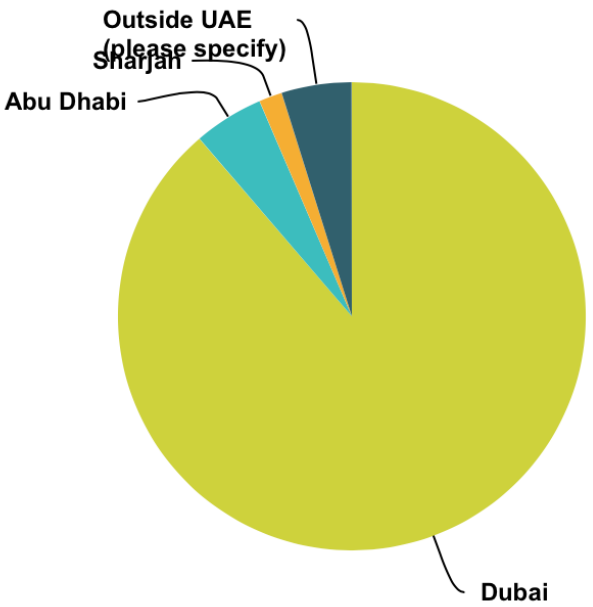
Answer Choices		Responses	
Category 1		64.41%	38
Category 2		16.95%	10
Category 3		10.17%	6
Other (please specify)	Responses	8.47%	5
Total			59

Figure 11 Respondents companies' classifications

5.2.1.4 Respondents' project locations

Figure 13 shows that 88.71% of respondents projects are in Dubai, 4.84% are in Abu

Dhabi, 1.61% are in Sharjah and 4.84% are from outside the United Arab Emirates.

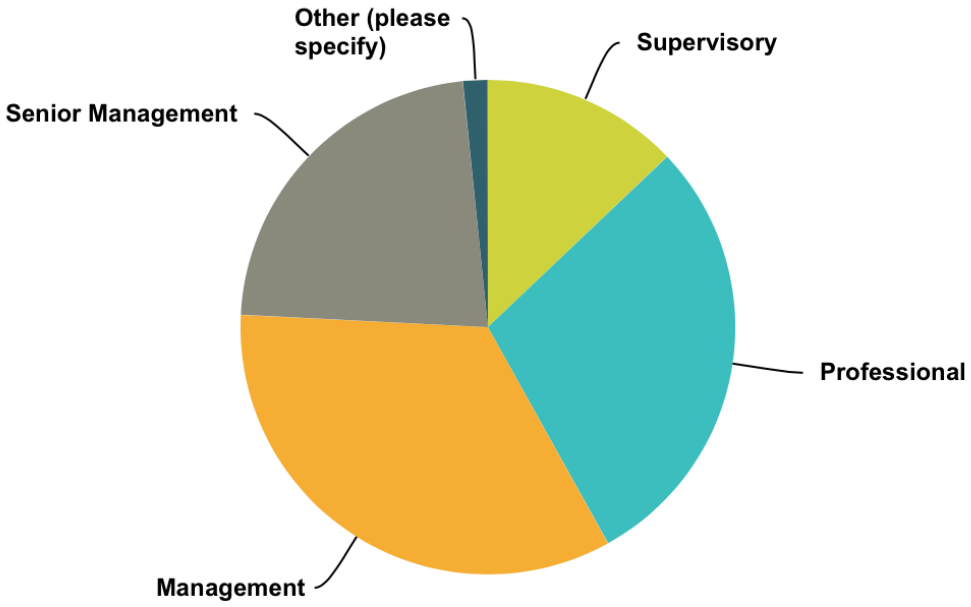


Answer Choices		Responses	
Dubai		88.71%	55
Abu Dhabi		4.84%	3
Sharjah		1.61%	1
Ajman		0.00%	0
Outside UAE (please specify)	Responses	4.84%	3
Total			62

Figure 12 Respondents projects' location

5.2.1.5 Respondents positions in their firms

Figure 14 shows that 12.9% of respondents are working in supervisory positions, 29.03% are in professional positions, 33.87% are in management positions, and 22.58% of respondents are in senior management positions.

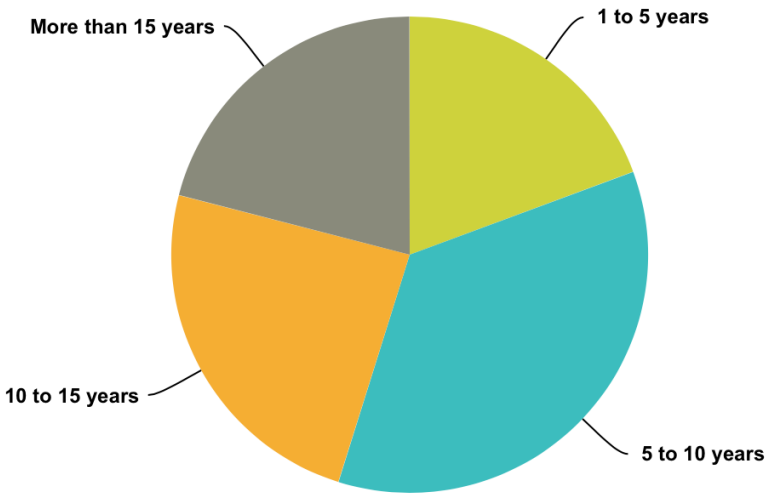


Answer Choices		Responses	
Supervisory		12.90%	8
Professional		29.03%	18
Management		33.87%	21
Senior Management		22.58%	14
Other (please specify)	Responses	1.61%	1
Total			62

Figure 13 Respondents positions in their firms

5.2.1.6 Respondents years of experience

Figure 15 shows that 19.35% of respondents have 1 to 5 years of experience, 35.48% have 5 to 10 years of experience, 24.19% have 10 to 15 years of experience and 20.97% of respondents have more than 15 years of experience.

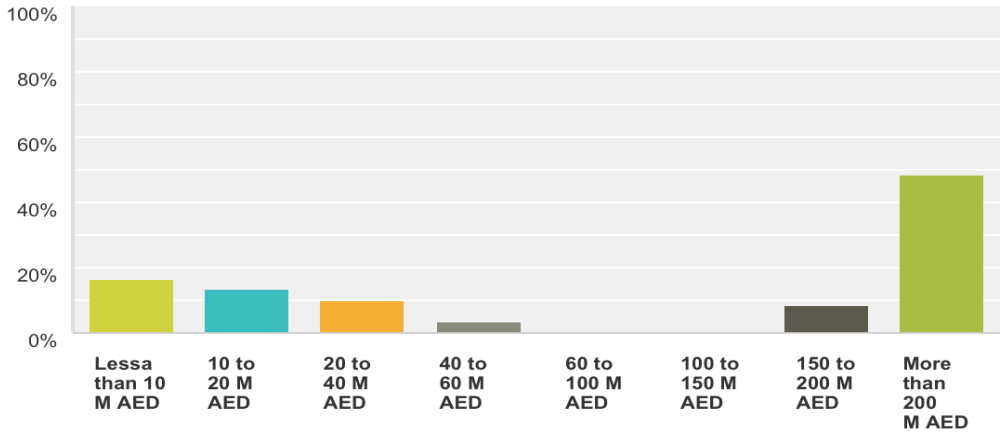


Answer Choices	Responses	
1 to 5 years	19.35%	12
5 to 10 years	35.48%	22
10 to 15 years	24.19%	15
More than 15 years	20.97%	13
Total		62

Figure 14 Respondents years of experience

5.2.1.7 Respondents' project sizes

Figure 16 shows that 16.67% of respondents projects are worth less than 10 million AED. 13.33% of projects are worth between 10 and 20 Million AED. 10% of projects are worth between 20 and 40 Million AED. 3.33% of projects are worth between 40 and 60 Million AED. 8.33% of projects are worth between 150 and 200 Million AED and 48.33% of projects are worth more than 200 Million AED.



Answer Choices	Responses	
Lessa than 10 M AED	16.67%	10
10 to 20 M AED	13.33%	8
20 to 40 M AED	10.00%	6
40 to 60 M AED	3.33%	2
60 to 100 M AED	0.00%	0
100 to 150 M AED	0.00%	0
150 to 200 M AED	8.33%	5
More than 200 M AED	48.33%	29
Total		60

Figure 15 Respondents projects' size (Value in AED)

5.2.2 Level of trust and trusting relationship assessment

Section 2 will show the results of the respondents regarding two groups of factors:

1- Factors that impact the main contractors and subcontractor relationship.

2- Factors that influence the early engagement of subcontractors.

5.2.2.1 Factors that impact subcontractors and main contractors' relationship

Table 10 and 11 show subcontractors and main contractors' responses and opinions about the importance of factors that impact their relationship where relative importance index and ranks are indicated in the tables.

The respondents were asked to pick a scale of importance of 1 to 5 points where (1) indicates the least important to (5), which indicates the most important. The Relative Importance Index (RII) technique is used for data analysis as per the following equation:

$$\mathrm{RII} = \frac{\sum W}{A * N}$$

Where:

W= weighting given to each factor by respondents that ranges from 1 to 5.

n1=Respondents number for not significant

n2=Respondents number for slightly significant

n3=Respondents number for significant

n4=Respondents number for very significant

n5=Respondents number for extremely significant

A=The maximum weight which is 5

N=total number of samples

Factors	Subcontractors and main contractors	
	RII	**Rank**
Open Communication	0.788	7
Company Culture	0.719	10
Information sharing	0.812	4
Long business relationship	0.835	2
Mutual Trust	0.819	3
Effective coordination	0.858	1
Early subcontractor engagement	0.773	8
Risk Sharing	0.804	6
Delay of payments	0.808	5
Attitude to subcontractors	0.754	9
Total	0.797	

Table 10 Rank and RII of factors that impact the main contractor and subcontractor relationships

Factors	Subcontractors and main contractors	
	RII	Rank
Effective coordination	0.858	1
Long business relationship	0.835	2
Mutual Trust	0.819	3
Information sharing	0.812	4
Delay of payments	0.808	5
Risk Sharing	0.804	6
Open Communication	0.788	7
Early subcontractor engagement	0.773	8
Attitude to subcontractors	0.754	9
Company Culture	0.719	10
Total	0.797	

Table 11 Rank and RII of factors that impact subcontractors and main contractors relationship in ascending order

Table 11 shows the factors that impact the main contractor and subcontractor relationships.

Effective coordination is ranked the most important factor that impacts the relationship

between subcontractors and main contractors with an RII of 0.858. The long business relationship is ranked as the second most important factor that impacts the relationship with an RII of 0.835, while mutual trust is ranked in third place with an RII of 0.819.

To some extent, the results agree with Yongtao et al. (2017), who found that the long business relationship is the most important factor that impacts main contractor and subcontractor relationship, followed by open communication and effective coordination, respectively, while mutual trust was in fourth position.

On the other hand, (company culture) was ranked the least important that impacts the relationship between subcontractors and main contractors, with an RII of 0.719, which means that this factor has the least influence on the relationship.

The results also agreed with the research argument that trust is one of the most crucial factors that impacts the main contractor and subcontractor relationships, as stated earlier in the literature review.

5.2.2.2 Factors that impact early engagement of subcontractors

Table 12 shows the respondents opinion regarding the most important factors that impact early subcontractors' engagement in a project from subcontractors and main contractors' perspectives as per the following ranks and RII (Relative Importance Index).

Factors	Subcontractors and main contractors	
	RII	Rank
Type of the contract	0.814	1
Scope of the project	0.8	2

Size of the project	0.8	3
Financial position of the company	0.777	4
Size of the company	0.732	5
Total	0.785	

Table 12 Factors that impact early contractor engagement

The respondents were asked to pick a scale of importance ranging from 1 to 5 points, where (1) indicates the least important to (5), which shows the most important. The Relative Importance Index (RII) technique is used for data analysis as per the equation mentioned earlier.

The study showed that (type of the contract) was the most important factor in this field of variables, with an RII of 0.814 and ranked in the first position. Scope of the project was ranked in the second most important factor with abn RII of 0.8, according to the analysis and observation in this field. (Size of the project) was ranked in the third most important factor with an RII of 0.8. Financial position of the company and size of the company were ranked in the fourth and fifth positions with an RII of 0.777 and 0.732, respectively. Subcontractors and main contractors found that the type of the project and the scope of the project are the most important factors that motivate them to be engaged early in a project. Also, the questionnaire results showed that 79.7% of respondents agreed to involve sub-contractors early in a project. However, only 20.5% were against this idea. This indicates that the majority of main contractors agree to engage sub-contractors early in a project, see Table 31 in Appendix 2.

5.2.3 Developing, building and maintaining trust

Section 3 shows the analysis results of the questionnaire regarding the factors that impact developing and building trust between subcontractors and main contractors as per the following:

1- Factors that impact trust development between subcontractors and main contractors.
2- Factors that impact trust building between subcontractors and main contractors.

The analysis will include analyzing the most important factors using the Relative Importance Index and ranking them according to the responses achieved from the subcontractors and main contractors' respondents.

5.2.3.1 Factors that impact trust development between subcontractors and main contractors

Table 14 shows the respondents' opinions regarding the most important factors that impact the main contractors' and subcontractors' trust development in a project life cycle.

Factors	Subcontractors and main contractors	
	RII	Rank
Reliability	0.891	1
Communication	0.877	2
Honesty	0.855	3
Timelessness	0.841	4
Integrity	0.809	5
Fairness	0.777	6
Goodwill	0.777	7

Shared norms and values	0.759	8
Openness	0.732	9
Relationship	0.723	10
Total	0.804	

Table 13 Ranks and RII of factors that impact trust development between subcontractors and main contractors

Using SPSS and Microsoft Excel, the researcher calculated and analyzed the total weights of the responses, as well as the relative importance index and ranks . The analysis showed that reliability was ranked in the first position as the most important factor that impacts subcontractors and main contractors' trust development, according to the respondents' opinion with an RII of 0.891. Then, communication was ranked as the second most significant element with an RII of 0.877, and honesty was listed as the third most significant element with an RII of 0.855. On the other hand, openness) and relationship) were ranked in the 9th and 10th positions with an RII of 0.732 and 0.723, respectively.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Design and planning stage	12	19.4	26.7	26.7
	Execution stage	16	25.8	35.6	62.2
	Monitoring and controlling stage	3	4.8	6.7	68.9
	Closing	1	1.6	2.2	71.1
	Execution, monitoring and controlling and closing stages	13	21	28.9	100
	Total	45	72.6	100	
Missing	System	17	27.4		
Total		62	100		

Table 14 Respondents' opinion about trust development in a project life cycle

The survey results showed that 26.7% of respondents agreed that trust is developed in the design and planning stage, 35.6% agreed that trust is drawn up in the execution stage and 28.9% of respondents that trust is drawn up in the execution stage, monitoring and controlling and closing stages, see Table 14.

According to the literature and derived assumptions in the conceptual framework chapter, trust was described as a gradual and self-reinforcing phenomenon (Zand 1972). Also, it is not an isolated incident, but rather a built up process (McDermott et al. 2007). The research assumed that trust is developed in the initiation and planning stages, while it also overlaps with the execution stage in the preconstruction and construction phases in a project where contractors are engaged early in a project. However, if subcontractors are involved in the execution stage, trust development will start in the execution stage, and it may take time to be built.

On the other hand, the survey results showed that 79.5% of main contractors agreed to engage sub-contractors early in a project, while only 20.5% did not agree, since early contractor engagement has many positive results in terms of both the project and the main contractor and subcontractor relationship. See Table 31 for further information.

5.2.3.2 Factors that impact building and maintaining trust between subcontractors and main contractors

Table 15 shows the factors that affect the subcontractors and main contractors' trust building in a project life cycle; moreover, it shows the relative importance factors) and the ranks of these factors.

Factors	Subcontractors and main contractors	
	RII	Rank
Project Performance	0.864	1
Problem solving	0.832	2
Past experience	0.813	3
Behaviour	0.791	4
Shared Goals	0.716	5
Openness	0.716	6
Total	0.789	

Table 15 RII and Ranks of factors that impact subcontractors and main contractors' trust building

The analysis showed that project performance is rated as the most important factor that impacts trust-building between subcontractors and main contractors in a project life cycle, with an RII of 0.864. Problem-solving was ranked as the second most important factor with

an RII of 0.832, while experience is ranked as the third most important factor that impacts trust building, with an RII of 0.813. On the other hand, shared goals and openness were ranked in the 5th and 6th positions with an RII of 0.716 for both factors.

The survey results regarding the influence of building trust on project performance enhancement showed that 57.8% of respondents agree that building trust between subcontractors and main contractors will enhance project performance significantly, while 42.2% of respondents doubt the influence of building trust on project performance. On the other hand, all respondents did not agree that trust does not impact project performance (see Table 31 in Appendix 2). Therefore, the research speculates that project performance is most significant in the main contractor and subcontractor relationship.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Design and planning stage	8	12.9	17.8	17.8
	Execution stage	21	33.9	46.7	64.4
	Monitoring and controlling stage	5	8.1	11.1	75.6
	Closing stage	4	6.5	8.9	84.4
	Execution to closing stage	7	11.3	15.6	100
	Total	45	72.6	100	
Missing	System	17	27.4		
Total		62	100		

Table 16 Respondents'' opinion about trust building in a project life cycle

The results showed that 46.7% of respondents think that trust is built in the execution phase. Further, 17.8% believe that trust is built in the design and planning stages, 11.1% believe that trust is built in monitoring and controlling stage, 8.9% think it is built in the closing stage and 15.6% believe that trust is built in execution to closing stage. The results agree with the research assumption that trust is built throughout the execution stage and is overlapped with the monitoring and controlling stage to the closing stage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Closing stage	11	17.7	24.4	24.4
	In the beginning of the project	5	8.1	11.1	35.6
	Execution stage	16	25.8	35.6	71.1
	Monitoring and controlling stage	13	21	28.9	100
	Total	45	72.6	100	
Missing	System	17	27.4		
Total		62	100		

Table 17 Respondents' opinions regarding maintaining trust in a project life cycle

The results above show that trust is maintained the in the execution stage, monitoring stage and closing stage. Where 35.6% of respondents think that trust can be maintained in the execution phase, 28.9% believe that trust is maintained in the monitoring and closing stage and 24.4% think that trust is maintained in the closing stage. However, only 11.1% believe that trust is maintained at the beginning of the project.

From these results, the researcher concludes that trust can be maintained while being built from the execution stage to the closing stage.

Current Main contractor-subcontractor relationship analysis

The questionnaire results showed that only 15.4% of respondents trust their contracting partners (Main contractors or subcontractors), whereas 76.9% of the respondents only trust their contracting partners to some extent and only 7.7% do not trust their contracting partner at all. Moreover, the results show that most of the respondents have trust issues with their contracting partners, which agrees with the rationale of the research and problem definition illustrated earlier. For further information, see Table 21 in Appendix 2.

On the other hand, the majority of the respondents agreed that trust between subcontractors and main contractors is significant, where 73.1% agreed that trust is very important and only 26.9% agreed that trust is necessary to some extent. For further information, see Table 21 in Appendix 2.

However, most respondents agreed that lack of trust would not lead to the termination of the contract, where 55.8% of respondents agreed that non-compliance with contractual conditions is the most critical factor that may lead to this consequence. For further information, see Table 22 in Appendix 2.

Also, some respondents added other reasons that may lead to termination of the contract, such as delay of payments to subcontractors, the blacklisting of a firm and when subcontractors affect the relationship of the main contractor with the client. For further information, see Table 23 in Appendix 2.

To test the subcontractors and main contractors' perceptions of each other, the researcher tested the sharing information factor. The results showed that only 13.5% of main contractors would complete the project if the subcontractor did not exchange information with the main contractor. Also, 42.3% would never consider working with the subcontractor in the future, and 38.5% would look for other subcontractors and terminate the contract with the subcontractor who is not sharing information with them. However, 34.6% of subcontractors would complete the project if the main contractor did not exchange information with them, 46.2% would complete the project and never consider working with the main contractor in future and only 17.3% would stop the work and seek termination of the contract. For further information, see Tables 24, 25 and 26 in Appendix 2, which show that sharing information factor is not as critical to the subcontractors as it is

to the main contractors. We can also conclude that subcontractors are more open to trusting the main contractors as opposed to the main contractors trusting subcontractors.

In this section, the questionnaire also tested the subcontractors and main contractors' perceptions of trusting each other through the payment receipt factor. The results showed that only 9.6% of subcontractors would work at the same pace if the main contractor delayed the payment to the subcontractor, while 57.7% of subcontractors would decrease the productivity, 25% would stop the work till they get paid and only 5% would claim the loss charges from the main contractor. Hence, it is obvious that the payment receipt factor is the more important to subcontractors than sharing information. Moreover, as observed from the analysis, payment delays could harm the project, since subcontractors would reduce the productivity and stop the work. For further information, see Tables 27, 28 and 29 in Appendix 2.

As mentioned earlier, cooperation is considered one of the behavioural consequences of trust (Lau et al. 2011). Also, trust has become a topic of major research in business management due to its importance in cooperation enhancement (Mcdermott et al. 2005). The questionnaire examined the subcontractors and main contractors' cooperation influence on their relationship in the design and planning stage and their reaction towards non-cooperative behaviour from one of the contracting partners. The results showed that 9.3% of respondents would sign the contract with the other contracting partner (main contractor/subcontractor). In addition, 76.7% would request to hold a meeting with the contracting partner and 14% of respondents would cancel the contract and look for a new, more cooperative subcontractor. See Table 30 in Appendix 2. Therefore, the results showed that cooperation is vital for the main contractors and subcontractor relationship. Moreover,

the results agree with our literature review findings, such as Laan et al. (2012), who concluded that cooperation and competence are the most important factors that influence trust in construction projects, and Hosmer (1994a, b), when the author stated that trust leads to commitment, innovation and cooperation, and vice versa.

The questionnaire asked the respondents to describe their relationship with main contractors. The results showed that only 9.5% described their relationship with their main contractors as an adversarial relationship, 7.1% of subcontractors described their relationship with their main contractors as collaborative, 54.8% of the subcontractors described their relationship with their main contractors as cooperative and 21.4% of subcontractors considered their relationship with their main contractors as partnering, while only 7.1% of subcontractors could not describe their relationship with their main contractors. On the other hand, most of the main contractors in the questionnaire have also described their relationships with the subcontractors, such as electrical and mechanical, decoration, aluminium and other subcontractors as cooperative where percentages varied between 57.14% to 66.67%. For further information, see Table 34 in Appendix 3.

5.2.4 Hypotheses test

The study proceeds the following hypotheses:

1- Hypothesis 1: (H0): There is a significant impact of trust on the main contractors and subcontractor relationship.

One way ANOVA was used to test the hypothesis, the results according to Table 18 shows that P-value is more than 0.05 and the value of F is greater than the value of the critical value. The critical value of F at df (2.50) and significance level 0.05 equal to 3.19 (See Table 36, Appendix 3). Therefore, the null hypothesis is accepted and hence, there is no

significant difference of respondents opinions that subcontractors and main contractors' relationship factors impact trust in a project life cycle at a significance level of 0.05.

ANOVA					
How important is the trust in subcontractors and main contractors' relationship?					
	Sum of Squares	df	Mean Square	F	Sig. (p-Value)
Between Groups	0.206	2	0.103	0.503	0.608
Within Groups	10.025	49	0.205		
Total	10.231	51			

Table 18 One way ANOVA test for respondents opinions about subcontractors and main contractors' relationship impact on trust

2- Hypothesis 2: (H0): Early subcontractor engagement in the inititiation and planning stage impact positively the subcontractors and main contractors relationship.

One way ANOVA was used to test the hypothesis, the results according to Table 19 shows that P-value is more than 0.05 and the value of F is greater than the value of the critical value. The critical value of F at df (1.075) and significance level 0.05 equal to 4.08 (See Table 36, Appendix 3). Therefore, the null hypothesis is accepted and hence, there is no significant difference of respondents opinions that early sub-contractor engagement in the initiation and planning stage impact positively the main contractor and subcontractor relationship at a significance level of 0.05.

ANOVA					
Do you agree to engage subcontractors early in a project (Design and planning stage)?					
	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	0.013	1	0.013	0.075	0.786
Within Groups	7.146	42	0.17		
Total	7.159	43			

Table 19 One way ANOVA test for early subcontractor engagement respondents' opinions

3- Hypothesis 3: (H0): The higher the level of trust between subcontractors and main contractors, the better the project performance.

One way ANOVA was used to test the hypothesis, the results according to Table 20 shows that P-value is more than 0.05 and the value of F is greater than the value of the critical value. The critical value of F at df (5.64) and significance level 0.05 equal to 2.32 (See Table 36, Appendix 3). Therefore, the null hypothesis is accepted and hence, there is no significant difference of respondents opinions that the higher the level of trust between subcontractors and main contractors, the better the project performance at a significance level of 0.05.

ANOVA					
Would the trust that have been built between the main contractor and subcontractor affect the productivity and performance of a project?					
	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	1.525	4	0.381	1.614	0.19
Within Groups	9.452	40	0.236		
Total	10.978	44			

Table 20 One way ANOVA test for trust impact on project performance

5.3 Summary of the chapter

This chapter has analyzed the survey results using quantitative methods and discussed the questionnaire questions that include four sections. Section (1) presented the results of general information of respondents, section (2) presented, ranked and analyzed the factors that impact subcontractors and main contractors' relationship and factors that impact early engagement of subcontractors. Section (3) presented, ranked and analyzed the questionnaire results of factors that impact trust development between subcontractors and main contractors, and factors that impact building and maintaining trust between them. Section (4) has tested the hypotheses developed earlier using One-Way ANOVA test in SPSS. The null hypotheses test results were positive and accepted since there were no significant differences of respondents' opinions.

Chapter Six: Conclusion and Recommendation

6.1 Conclusion

This chapter includes the conclusion, recommendation for subcontractors and main contractors to improve their trusting relationship in addition to the recommendation for further study.

Trust found to be a critical factor for construction projects success or failure according to Latham (1994) and Egan. J (1998). When the attributes of large construction projects may include and not limited to complexity, uncertainty and high risks. A complex project may include specialties that not all parties are capable of doing when the greater the complexity of a project the greater the need for trust and the greater the main contractor need to depend on outsourcing partners and rely on them to complete activities.

Trust issues and adversarial relationships have increased recently between main contractors and other stakeholders such as clients and subcontractors especially after the oil price drop which affected the construction industry in the United Arab Emirates significantly according to (EY, 2016). Therefore, the need to rebuilding the trust in the sector was vital. The aim of this study was to investigate the relationship between subcontractors and main contractors and associated factors that impact trust between parties in construction projects in the United Arab Emirates.

The research has investigated the relationship between subcontractors and main contractors in the literature review and identified several factors that impact subcontractors and main contractors' relationships such as; long business relationship, mutual trust, culture, effective coordination etc. according to (Yongtao et al. 2017). It identified the main trust dimensions that affect the relationships between subcontractors and main contractors, and defined main

factors that contribute to rebuilding (develop, build and maintain) trust between subcontractors and main contractors during the crisis. Based on the findings in literature review the researcher has developed an approach to rebuild trust between them throughout the project life cycle.

Using quantitative research method, the researcher has developed from literature a questionnaire and distributed to professional in construction sector using online survey application in order to examine the subcontractors and main contractors' perception towards each other and suggest improvements to enhance subcontractors and main contractors' trusting relationship.

The research analysis concluded that trust is one of the most crucial factors that impact subcontractors and main contractors' relationship, However, Openness and Relationship were ranked the least important factors that impact trust development between subcontractors and main contractors.

Even though, analysis showed that most of subcontractors and main contractors describe their current relationship as a cooperative relationship and effective coordination was ranked the most important factor that impacts their relationships, followed by long business relationships and mutual trust. The analysis found that subcontractors were more likely to trust main contractors than vice versa.

Trust is simultaneously built and maintained from the execution stage to the closing stage; and project performance is the strongest factor directly influencing building trust in a project life cycle between main contractors and subcontractors, followed by problem-solving and experience.

Various factors influence the level of trust between main contractors and subcontractors. Reliability was ranked the most important factor that impacts the trust development of subcontractors and main contractors in a project's life cycle, followed by communication and honesty. Sharing information was found to have high significance to both main contractors and subcontractors, while the receipt of payment was more significant to subcontractors rather than to main contractors.

When it comes to the factors that affect trust in the aspect of contractor engagement, the type of the project as well as the scope of work were ranked the most important factors that impact early subcontractors' engagement decisions.

The least influential factor on the relationships between main contractors and subcontractors company culture. Nonetheless, as significant of a factor as it is to the relationships between subcontractors and main contractors, a lack of trust would not lead to terminating the contract between them.

6.2 Recommendation

According to the research analysis, the following recommendations are vital to improve subcontractors and main contractors' trusting relationship:

It is recommended for construction firms to develop strategic model to enhance their relationships with their contracting partners. To effectively coordinate with other stakeholders regarding the projects' activities from the planning stage to the closing stage.

Moreover, participants are urged to share information between them to enhance the project performance.

Subcontractors and main contractors are advised to have a risk sharing attitude and encouraged to have open communication between each other. Also, they must treat each other with respect and good attitude. In addition, Main contractors are recommended to engage their subcontractors as early as possible in projects.

6.2 Limitation of the study

The limitation of this research include:

1. The research has investigated main contractors and subcontracting trusting relationships mainly in United Arab Emirates only.
2. The research has focused on the main contractor-subcontractor relationship excluding other stakeholders such as; clients, suppliers, and consultants.
3. The research has focused on Category (1) building contractors only since the study examines complex construction projects that their value equals or exceeds 100 M AED.
4. The research questions were created for large complex projects excluding other lower scale projects that are less than 100 M AED.
5. This study examines the subcontractors and main contractors trusting relationships after the subcontractors' selection stage which means after signing the contract for a project.

6.3 Recommendation for further study

This dissertation has obtained the research aims and objectives mentioned in chapter 1, however, it recommends to further study the following:

1. (effective coordination) factor influence on enhancing subcontractors and main contractors' relationship.
2. The impact of trust on Subcontractors and main contractors' relationship dimensions such as; collaboration, cooperation, and partnering.

3. The influence of (reliability, communication and honesty) on subcontractors and main contractors trust development throughout the project life cycle.
4. The impact of trust on project performance in terms of cost, time and quality.

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APPENDICES

Appendix 1- Questionnaire

Questionnaire

Subcontractors and main contractors trust in complex construction projects

Dear Sir / Madam,

Kindly answer the following questionnaire that attempts to answer some of the questions about relationships between subcontractors and main contractors. The study aims to examine the willingness of contractors and subcontractors in terms of trusting each other and forming such a relationship in order to rank the most crucial factors that impact such a relationship in complex construction projects and to suggest improvements and recommendations to enhance the subcontractors and main contractors trusting relationships. This questionnaire targets the main contractor and subcontractor professionals. Please visit or copy/paste the link below: https://www.esurveycreator.com/s/ab7d25f for online questionnaire.

This research will be submitted in partial fulfilment of the requirements for the degree of Master of science in Project Management at the British University in Dubai.
The researcher appreciates the effort in answering the questionnaire, bearing in mind that all information given will be treated confidentially and used for academic purposes.

Student Name Ramaz Issa
Student ID: 2013303020
Email: 2013303020@student.buid.ac.ae

Note: Questions for main contractors only are indicated by (Main contractors) and questions for subcontractors only are indicated by (Subcontractors).

1. What is your gender?

- ◯ Female
- ◯ Male

2. What is your construction industry field?

- ◯ Main Contracting
- ◯ Subcontracting

3. What is your Company classification?

- ◯ Category 1
- ◯ Category 2
- ◯ Category 3
- ◯ Other (please specify)

4. Where is the location of your project?

- ◯ Dubai
- ◯ Abu Dhabi
- ◯ Sharjah
- ◯ Ajman
- ◯ Outside UAE (please specify)

5. What is your position in the firm you are working for?

- ◯ Supervisory
- ◯ Professional
- ◯ Management
- ◯ Senior Management
- ◯ Other (please specify)

6. How many years of experience do you have?

- ◯ 1 to 5 years
- ◯ 5 to 10 years
- ◯ 10 to 15 years
- ◯ More than 15 years

7. What is your project size in AED (Value)?

ID:2013303020

Note: Questions for main contractors only are indicated by (Main contractors) and questions for subcontractors only are indicated by (Subcontractors).

8. To what extent do you trust your contracting partner (Main contractor/Subcontractor)?

- ◯ I do not trust my contracting partner
- ◯ I trust my contracting partner to some extent
- ◯ I fully trust my contracting partner

9. On a scale of 1 (least important) to 5 (more important), rate the factors that have an impact on the main contractor and subcontractor relationship.

	1	2	3	4	5
Open Communication	◯	◯	◯	◯	◯
Company culture	◯	◯	◯	◯	◯
Information sharing	◯	◯	◯	◯	◯
Long business relationship	◯	◯	◯	◯	◯
Mutual trust	◯	◯	◯	◯	◯
Effective coordination	◯	◯	◯	◯	◯
Early involvement of subcontractors	◯	◯	◯	◯	◯
Risk sharing	◯	◯	◯	◯	◯
Delay of payment to the subcontractors	◯	◯	◯	◯	◯
Attitude to the subcontractors	◯	◯	◯	◯	◯

10. How important is trust in the main contractor and subcontractor relationship?

- ◯ Very important
- ◯ Important to some extent
- ◯ Not important

11. In your opinion, what is the most critical situation that may lead to termination of the contract between the main contractor and subcontractor?

- ◯ One of the parties doesn't comply with the conditions of contract
- ◯ Termination of the project by the owner
- ◯ The project is postponed
- ◯ You don't trust your contracting partner
- ◯ Other (please specify)

12. In your opinion, what would the main contractor do if the subcontractor does not share information with him?

- ◯ The main contractor would complete the project until closing
- ◯ The main contractor would never consider working with this subcontractor again after completing the project
- ◯ The main contractor would look for more reliable subcontractor and terminate the contract with the existing one
- ◯ Other (please specify)

13. What would happen if the main contractor could not pay your trusted subcontractor on time?

- ◯ The subcontractor would still work in the same pace
- ◯ The subcontractor would decrease productivity
- ◯ The subcontractor would stop work till the main contractor pays him
- ◯ The subcontractor would charge the main contractor the losses and go for dispute
- ◯ Other (please specify)

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14. In your opinion, what would the subcontractor do if the main contractor does not share information with him?

- ◯ The subcontractor would complete the project till closing
- ◯ The subcontractor would complete the project and never work with the main contractor again in future
- ◯ The subcontractor would stop the work and seek termination of the contract
- ◯ Other (please specify)

15. (Main Contractors) How would you describe your relationships with the following subcontractors?

	Adversarial		Collaborative		Cooperative		Partnering		None	
Mechanical Electrical and Plumbing (MEP)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Joinery	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Decoration	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Aluminum	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Masonry works	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Carpentry works	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other Subcontractors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

16. (Subcontractors) How would you describe your relationship with your Main contractor?

- ◯ Adversarial
- ◯ Collaborative
- ◯ Cooperative
- ◯ Partnering
- ◯ None

Note: Questions for main contractors are only indicated by (Main contractors) and questions for subcontractors only are indicated by (Subcontractors).

17. Do you agree to engage the subcontractors early in a project (Design or planning stage)?

- ◯ Agree
- ◯ I do not agree

18. On a scale of 1 (least important) to 5 (Most important), rate the factors that impact the early contractor engagement in a project in the (Design or planning stage)?

	1	2	3	4	5
Financial position of the contracting partner (Main contractor/Subcontractor)	◯	◯	◯	◯	◯
Size of the company	◯	◯	◯	◯	◯
Size of the project	◯	◯	◯	◯	◯
Scope of the project	◯	◯	◯	◯	◯
Type of the contract	◯	◯	◯	◯	◯

19. In which stage or (stages) can trust between main contractor and subcontractor be developed?

- ◯ Design and planning
- ◯ Execution
- ◯ Monitoring and controlling
- ◯ Closing
- ◯ Execution, monitoring and controlling and closing stages

20. In which stage can trust be built between main contractor and subcontractor?

- ◯ Design and Planning stage
- ◯ Execution stage
- ◯ Monitoring and controlling stage
- ◯ closing stage
- ◯ Execution to the closing stage

21. In which stage can trust be maintained between a main contractor and subcontractor?

- ◯ Closing stage
- ◯ In the beginning of the project
- ◯ Execution stage
- ◯ Monitoring and controlling stage

22. On a scale of 1 (Least important) to 5 (Most important), rate the following factors that impact the main contractor and subcontractor trust development?

	1	2	3	4	5
Relationship	◯	◯	◯	◯	◯
Fairness	◯	◯	◯	◯	◯
Openness	◯	◯	◯	◯	◯
Shared norms and values	◯	◯	◯	◯	◯
Goodwill	◯	◯	◯	◯	◯
Communication	◯	◯	◯	◯	◯
Honesty	◯	◯	◯	◯	◯
Timelessness	◯	◯	◯	◯	◯
Integrity	◯	◯	◯	◯	◯
Reliability	◯	◯	◯	◯	◯

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23. What would you do if your trusted contracting partner (Main contractor/Subcontractor) is not being reliable and is underperforming?

- ◯ Continue working with him
- ◯ Raise the issue to the client
- ◯ Seek termination of the contract and charge the losses
- ◯ Other (please specify)

24. On a scale of 1 (least important) to 5 (most important), rate the factors that lead to building trust between you and your subcontractor/Main contractor.

	1	2	3	4	5
Past experience	◯	◯	◯	◯	◯
Project performance(Productivity, timelessness and quality)	◯	◯	◯	◯	◯
Shared goals	◯	◯	◯	◯	◯
Openness	◯	◯	◯	◯	◯
Problem solving	◯	◯	◯	◯	◯
Behavior	◯	◯	◯	◯	◯

25. Does the trust built between the main contractor and subcontractor affect the productivity and performance of a project?

- ◯ Yes for sure
- ◯ Yes to some extent
- ◯ Never

26. What would you do if you observed that your contracting partner (Main contractor/Subcontractor) is not cooperating in the design or planning stage?

- ◯ Sign the contract with the contracting partner anyway
- ◯ Hold meeting with the contracting partner and push him to cooperate
- ◯ Cancel signing the contract and find new contracting partner who is more cooperative
- ◯ Other (please specify)

27. What would you do if your contracting partner (Main contractor/subcontractor) is not behaving in an honest manner and gives false information?

- ◯ Express the issue with him via formal or non-formal communication channels
- ◯ Let it go
- ◯ Never consider him in your future projects again
- ◯ Terminate the contract

28. How would you react if your trusted contracting partner (Main contractor/Subcontractor) impacted your project performance negatively?

- ☐ Complete the project anyway, I should have observed his low performance earlier
- ☐ Terminate the contract and charge the contracting partner the loses
- ☐ Never consider working with him in future projects
- ☐ Other (please specify)

Appendix 2

Survey results

1- To what extent do you trust your contracting partner (Main contractor/Subcontractor)?

	Options	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Contractors do not trust each other	4	6.50%	7.70%	7.70%
	Contractors trust each other partially	40	64.50%	76.90%	84.60%
	Contractors fully trust each other	8	12.90%	15.40%	100%
	Total	52	83.90%	100%	
Missing	System	10	16.10%		
Total		62	100%		

Table 21 Respondents level of trust assessment frequencies (SPSS)

2- How important is trust in the main contractors and subcontractor relationship?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	38	61.3	73.1	73.1
	Important to some extent	14	22.6	26.9	100
	Total	52	83.9	100	
Missing	System	10	16.1		
Total		62	100		

Table 22 Importance of trust in subcontractors and main contractors relationships responses frequencies and percentages

3- In your opinion, what is the most critical situation that may lead to the termination of the contract between a main contractor and subcontractor?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	4	6.5	7.7	7.7
	One of the parties doesn't comply with the conditions of contract	29	46.8	55.8	63.5
	Termination of project by the owner	10	16.1	19.2	82.7
	The project is postpond	6	9.7	11.5	94.2
	You dont trust your contracting partner	3	4.8	5.8	100
	Total	52	83.9	100	
Missing	System	10	16.1		
Total		62	100		

Table 23 Termination of contract factors measured by assessment frequencies and percentages

4- Other (Termination of contract)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		58	93.5	93.5	93.5
	Financials, delay of payments	1	1.6	1.6	95.2
	I	1	1.6	1.6	96.8
	Their firm might be blacklisted and not technically sound	1	1.6	1.6	98.4
	When the subcontractor negatively affects the relationship between the main contractor and the client and/or the engineer	1	1.6	1.6	100
	Total	62	100	100	

Table 24 Termination of contract factors: respondents opinions

5- In your opinion, what would the main contractor would do if the subcontractor was not sharing information?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3	4.8	5.8	5.8
	The main contractor would complete the project until closing	7	11.3	13.5	19.2
	The main contractor would never consider working with subcontractor	22	35.5	42.3	61.5
	The main contractor would look for more reliable subcontractors and terminate the contract with the existing one	20	32.3	38.5	100
	Total	52	83.9	100	
Missing	System	10	16.1		
Total		62	100		

Table 25 Sharing information factor (Main contractor Perspective)

6- Other (Sharing info)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		59	95.2	95.2	95.2
	At first, clarify the importance of participation with the subcontractor, if not committed. Follow up supervision excessively.After the project's end, to avoid the problem, placing a clause in the contract helps to avoid problems in the future	1	1.6	1.6	96.8
	Delay the payment	1	1.6	1.6	98.4
	If the project has a time variation and flexibility, then the main contractor can arrange another sub contractor	1	1.6	1.6	100
	Total	62	100	100	

Table 26 Sharing information factor (Respondents' Opinions)

7- What would happen if the main contractor could not pay your trusted subcontractor on time?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	1.6	1.9	1.9
	The subcontractor would still work at the same pace	5	8.1	9.6	11.5
	The subcontractor would decrease productivity	30	48.4	57.7	69.2
	The subcontractor would stop work until the main contractor paid him	13	21	25	94.2
	The subcontractor would charge the main contractor the losses and push for a dispute	3	4.8	5.8	100
	Total	52	83.9	100	
Missing	System	10	16.1		
Total		62	100		

Table 27 Payment receipt factor impact on trust

8- Other (Pay on time)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		61	98.4	98.4	98.4
	Depends on the size of the financial payment. A lower payment often reduces production, but if it is low enough, he will stop working altogether.	1	1.6	1.6	100
	Total	62	100	100	

Table 28 respondents' opinions regarding payment receipt delay

9- In your opinion, what would the subcontractor do if the main contractor was not sharing information with him?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	1.6	1.9	1.9
	The subcontractor would complete the project	18	29	34.6	36.5
	The subcontractor would complete the project and never work with the main contractor again in future	24	38.7	46.2	82.7
	The subcontractor would stop the work and seek termination of the contract	9	14.5	17.3	100
	Total	52	83.9	100	
Missing	System	10	16.1		
Total		62	100		

Table 29 Sharing information factor (Subcontractor perspective)

10- Other (Sharing info-Sub)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		61	98.4	98.4	98.4
	The subcontractor would still work at the same pace. While attempting to officially transfer the risk resulting from not sharing the information with the contractor	1	1.6	1.6	100
	Total	62	100	100	

Table 30 Sharing information respondents' opinions

11- How does the trust built between the main contractor and subcontractor affect the productivity and performance of a project?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes for sure	26	41.9	57.8	57.8
	Yes to some extent	19	30.6	42.2	100
	Total	45	72.6	100	
Missing	System	17	27.4		
Total		62	100		

Table 31 Impact of trust on project performance respondents' opinions.

12- What would you do if you observed that your contracting partner (main contractor/subcontractor) is not cooperating in the design or planning stage)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sign the contract with the contracting partner anyway	4	6.5	9.3	9.3
	Hold meeting with the contracting partner and push him to cooperate	33	53.2	76.7	86
	Cancel signing the contract and find a new contracting partner who is more cooperative	6	9.7	14	100
	Total	43	69.4	100	
Missing	System	19	30.6		
Total		62	100		

Table 32 Respondents' opinions about the impact of the cooperation factor on the main contractor and subcontractor relationship in the design and planning stage

13- Do you agree with engaging subcontractors early in a project (Design and planning stage)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	35	56.5	79.5	79.5
	I do not agree	9	14.5	20.5	100
	Total	44	71	100	
Missing	System	18	29		
Total		62	100		

Table 33 Respondents' opinions on the early engagement of contractors in the design and planning stage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Adversarial	4	6.5	9.5	9.5
	Collaborative	3	4.8	7.1	16.7
	Cooperative	23	37.1	54.8	71.4
	Partnering	9	14.5	21.4	92.9
	None	3	4.8	7.1	100
	Total	42	67.7	100	
Missing	System	20	32.3		
Total		62	100		

Table 34 Subcontractors' descriptions of their relationships with their main contractors

Appendix 3

Survey Tables

	Level of significance P-Value for two tailed test			
df	**0.1**	**0.05**	**0.02**	**0.01**
1	0.988	0.997	0.9995	0.9999
2	0.9	0.95	0.98	0.99
3	0.805	0.878	0.934	0.959
4	0.729	0.811	0.882	0.917
5	0.669	0.754	0.833	0.874
6	.622	0.707	0.789	0.834
7	0.582	0.666	0.75	0.798
8	0.549	0.632	0.716	0.765
9	0.521	0.602	0.685	0.735
10	0.497	0.576	0.658	0.708
11	0.476	0.553	0.634	0.684
12	0.458	0.532	0.612	0.661
13	0.441	0.514	0.592	0.641
14	0.426	0.497	0.574	0.623
15	0.412	0.482	0.558	0.606
16	0.4	0.468	0.542	0.59
17	0.389	0.456	0.528	0.575
18	0.378	0.444	0.516	0.561
19	0.369	0.433	0.503	0.549
20	0.36	0.423	0.492	0.537
21	0.352	0.413	0.482	0.526
22	0.344	0.404	0.472	0.515
23	0.337	0.396	0.462	0.505
24	0.33	0.388	0.453	0.496
25	0.323	0.381	0.445	0.487
26	0.317	0.374	0.437	0.479
27	0.311	0.367	0.43	0.471

28	0.306	0.361	0.423	0.463
29	0.301	0.355	0.416	0.456
30	0.296	0.349	0.409	0.449
35	0.275	0.325	0.381	0.418
40	0.257	0.304	0.358	0.393
45	0.243	0.288	0.338	0.372
50	0.231	0.273	0.322	0.354
60	0.211	0.25	0.295	0.325
70	0.195	0.232	0.274	0.303
80	0.183	0.217	0.256	0.283
90	0.173	0.205	0.242	0.267
100	0.164	0.195	0.23	0.254

Table 35 Pearson's Correlation Coefficient r (Critical Values)

	Open communication	Company Culture	Information sharing	Long business relationship	Mutual trust	Effective coordination	Early subcontractor engagement	Risk sharing	Delay of payment to subcontractors	Attitude to subcontractors
n1	5	5	5	5	5	5	5	5	5	5
n2	5	5	5	5	5	5	5	5	5	4
n3	5	5	5	5	5	5	5	5	1	5
n4	5	5	3	5	5	5	5	5	3	5
n5	5	4	5	5	5	5	5	5	4	4
n6	5	4	5	4	3	5	4	5	5	3
n7	5	4	5	3	4	5	4	5	5	5
n8	5	4	5	3	4	5	3	3	5	2
n9	5	4	4	5	5	5	5	5	1	3
n10	5	3	5	5	5	5	5	5	5	5
n11	5	3	5	5	5	5	4	4	5	5
n12	5	3	5	5	4	4	5	5	5	4
n13	5	3	4	5	5	5	5	4	4	3
n14	5	3	4	4	4	5	5	4	4	4

n15	5	2	5	4	5	4	3	5	5	4
n16	4	5	5	5	5	5	5	5	5	5
n17	4	5	5	5	5	5	3	3	3	4
n18	4	5	4	5	4	5	5	4	5	5
n19	4	5	3	5	3	4	3	3	5	3
n20	4	4	5	5	5	5	5	4	4	4
n21	4	4	5	5	5	5	3	5	4	5
n22	4	4	5	5	4	4	2	2	5	4
n23	4	4	5	4	5	4	4	5	5	5
n24	4	4	5	4	4	4	4	5	4	5
n25	4	4	4	5	4	5	4	4	3	4
n26	4	4	4	3	3	5	4	5	4	4
n27	4	4	3	4	5	4	4	3	4	5
n28	4	4	3	4	1	2	2	3	1	1
n29	4	4	3	3	5	5	5	4	4	3
n30	4	3	5	4	5	5	3	4	3	4
n31	4	3	5	3	5	5	3	4	5	4
n32	4	3	4	5	5	4	4	5	5	4
n33	4	3	4	4	4	4	2	5	3	3
n34	4	3	4	3	5	2	4	3	5	2
n35	4	3	3	4	4	4	4	5	4	3
n36	4	2	3	4	4	4	4	4	4	3

n37	3	4	5	5	5	5	5	5	3	5
n38	3	4	5	5	3	5	5	2	5	3
n39	3	4	5	4	5	5	4	4	5	4
n40	3	4	4	4	4	5	3	3	5	4
n41	3	4	3	4	4	4	4		5	3
n42	3	4	3	3	4	4	4	4	4	4
n43	3	3	4	4	3	4	4	4	4	4
n44	3	3	4	4	3	3	3	2	3	3
n45	3	3	3	5	4	5	3	4	4	5
n46	3	3	3	4	4	4	4	5	3	4
n47	3	3	3	4	4	3	4	4	4	4
n48	3	3	3	3	3	3	4	3	5	3
n49	3	3	3	2	2	1	2	4	5	3
n50	3	1	4	4	2	5	2	2	5	3
n51	2	2	1	3	3	3	3	3	2	2
n52	2	2	1	2	1	1	2	1	1	1
Total	205	187	211	217	213	223	201	205	210	196

Table 36 Factors that impact the main contractor and subcontractor relationship: response weights

Table 37 Factors that impact trust development: total weights and RII

	Financial Position	Size of the company	Size of the project	Scope of the project	Type of the contract
n1	3	2	3	3	2
n2	1	2	3	2	2
n3	5	4	4	4	4
n4					
n5	4	4	3	4	5
n6					
n7	5	4	5	4	4
n8	4	4	3	4	4
n9					
n10	5	4	4	5	4
n11	3	4	4	5	4
n12	4	4	3	3	3
n13	4	3	3	4	4
n14	3	3	4	4	3
n15	3	5	4	3	5
n16	4	3	3	5	5
n17	4	4	5	4	5
n18	3	3	3	4	4
n19					
n20	3	3	3	3	3
n21	1	3	3	5	5
n22	5	5	5	5	5
n23	5	4	4	5	5
n24	4	2	4	3	2
n25	3	3	5	5	3
n26	3	3	4	5	4
n27	5	4	4	5	5
n28	3	3	4	1	3
n29	4	4	5	5	5
n30	4	4	4	4	4
n31	4	3	2	3	5
n32	3	2	3	2	3
n33	5	5	5	5	3
n34					
n35	3	4	5	4	4

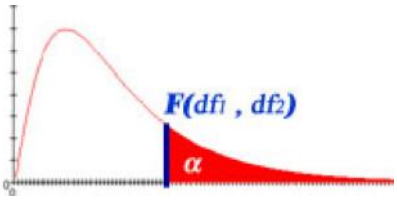
n36					
n37	5	4	5	5	4
n38	4	5	5	5	3
n39	3	3	4	5	5
n40	3	4	3	4	4
n41	5	4	3	2	4
n42	4	3	5		4
n43	5	3	4	4	5
n44					
n45	5	3	5	5	4
n46	5	5	5	5	5
n47	5	4	4	4	4
n48	3	4	5	4	5
n49	3	3	3	4	4
n50	5	5	5	5	5
n51	5	5	5	5	5
n52	1	1	1	1	1
Total	**171**	**161**	**176**	**176**	**179**
RII	**0.777**	**0.732**	**0.8**	**0.8**	**0.814**

	Relationship	Fairness	Openness	Shared norms and values	Goodwill	Communication	Honesty	Timelessness	Integrity	Reliability
	1	3	1	1	2	1	1	2	2	2
	1	3	2	2	2	5	3	3	3	4
	3	3	3	3	3	3	3	3	3	3
	4	4	3	5	5	4	4	5	4	4
	5	5	4	4	5	5	5	4	5	5
	4	4	4	4	4	4	4	4	4	4
	3	3	3	3	3	4	2	3	3	3
	3	3	3	5	4	4	5	3	3	4
	3	3	4	4	4	5	5	5	5	5
	4	4	3	3	2	4	4	3	3	3
	3	3	3	3	5	4	4	3	3	3
	4	4	3	4	4	4	4	5	3	4
	2	4	4	5	5	5	5	5	5	5
	3	3	4	4	4	4	4	4	4	4
	4	4	4	3	4	5	4	4	4	4
	3	5	4	5	5	4	4	3	4	5
	5	4	4	5	4	5	5	4	4	4
	5	5	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5	5
	4	4	4	3	2	4	4	4	4	4
	3	4	3	4	3	4	4	5	5	5
	4	3	3	3	3	4	4	4	4	5
	5	4	4	2	3	4	4	4	4	5
			3	2	3	3	4	4	4	4
	4	3	4	5	5	5	4	4	3	4
	4	4	4	4	4	4	4	4	4	4
	2	4	3	3	4	2	2	3	4	5
	4	5	5	3	4	5	5	4	4	5
	5	4	3	4	4	4	4	4	4	4
	4	3	4	4	4	5	5	3	2	4
	4	4	5	5	3	5	5	5	4	5
	2	4	2	2	5	4	4	5	3	5
	3	5	3	3	4	4	5	5	4	4
	3	4	4	4	5	4	4	4	4	4

	1	3	2	3	3	4	3	3	4	5
	3	4	3	4	2	5	5	5	5	5
	4	4	3	3	2	5	5	4	4	5
	5	4	4	3	4	3	5	4	4	4
	5	5	5	5	5	5	5	5	5	5
	5	4	3	3	4	5	5	4	4	4
	4	5	3	4	4	5	4	5	5	5
	3	2	3	3	2	5	3	5	3	5
	5	5	5	5	4	5	5	5	5	5
	5	5	5	5	5	5	5	5	5	5
	3	3	5	5	5	5	5	5	5	5
Total	159	171	161	167	171	193	188	185	178	196
RII	0.723	0.777	0.732	0.759	0.777	0.877	0.855	0.841	0.809	0.891

Table 38 Factors that impact early contractor engagement (SPSS)

F Table for α = 0.05



/	df_1=1	2	3	4	5	6	7	8
df_2=1	161.4476	199.5	215.7073	224.5832	230.1619	233.986	236.7684	238.8827
2	18.5128	19	19.1643	19.2468	19.2964	19.3295	19.3532	19.371
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.041
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.866	3.787	3.7257
8	5.3177	4.459	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296
10	4.9646	4.1028	3.7083	3.478	3.3258	3.2172	3.1355	3.0717
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.948
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408
16	4.494	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911
17	4.4513	3.5915	3.1968	2.9647	2.81	2.6987	2.6143	2.548
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768

20	4.3512	3.4928	3.0984	2.8661	2.7109	2.599	2.514	2.4471
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965
23	4.2793	3.4221	3.028	2.7955	2.64	2.5277	2.4422	2.3748
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551
25	4.2417	3.3852	2.9912	2.7587	2.603	2.4904	2.4047	2.3371
26	4.2252	3.369	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205
27	4.21	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053
28	4.196	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913
29	4.183	3.3277	2.934	2.7014	2.5454	2.4324	2.3463	2.2783
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662
40	4.0847	3.2317	2.8387	2.606	2.4495	2.3359	2.249	2.1802
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.097
120	3.9201	3.0718	2.6802	2.4472	2.2899	2.175	2.0868	2.0164
∞	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384

Table 39 Critical values of F for the 0.05 significance level