Models of Training Needs Assessment for the Iraqi Construction industry

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ABSTRACT

Construction companies are the engines that drive a nation's economy and must train their workforce effectively to enhance their performance. It has been recognised that training is the most effective tool for improving the performance and efficiency of the construction workforce; practitioners, academics, government agencies, professional institutions and clients of the construction industry all agree. In recognition of this, the industry must endeavour to provide a truly professional service or product, which is qualitatively superior and gives value for money. The on-going skills deficiency in the Iraqi construction industry calls for urgent remedies, of which training is one solution which is becoming an important issue in this sector at present. The aim of the present research is to develop models that will help to assess skills and knowledge needs for the Iraqi construction industry. This research is also concerned with finding an appropriate body of skills and knowledge related to the Iraqi construction industry, based on what construction site managers, project managers, civil engineers and architects actually do; how they perceive the importance of such tasks now and in the future. This study explains all of the issues concerning TNA practices in terms of how TNA is conducted, i.e., how training needs are assessed and how assessment is delivered. This study also investigates all the drivers and challenges that face TNA activities. The perception of the importance of the TNA outcome is also considered. This research is mainly focused on construction engineers: site managers, civil engineers, project leaders and architects; their attitudes, perceptions and viewpoints towards the research objectives.

The data presented is derived from a study of 239 Iraqi construction employees and subsequently analysed using the Statistical Package for Social Science (SPSS) software. This study reveals that the level of adoption of organizational training needs assessment procedures among training managers in the selected organizations is moderately high. However, the level of adoption of occupational and individual training needs assessment is lower. Most training managers are using surveys or interviews as methods to solicit information for training needs assessment purposes. The job analysis method is occasionally used in conducting training needs assessment, while measurement of the knowledge and skills of individuals is seldom done. It is also indicated that the respondents agree that training should be focused mostly on project management skills and site management administration knowledge; priority must be given to training needs through performance appraisal and site visits. The author thinks that the findings of this study might face an uphill

struggle, in trying to get it accepted and then taken on-aboard by the construction industry. Nevertheless, there are strong and powerful signs (or at least a very strong indicators) of economic improvement in Iraq, that makes this study an important and extremely relevant lever, in the process of such economic improvement.To the best of the researcher's knowledge, this study will be the first of its kind in the Iraqi construction industry to be undertaken. The findings will enrich the existing literature on the quality of training programmes in the construction industry and fill the gaps in knowledge of studies on Iraq in particular. This study makes a contribution to knowledge on both the academic and practical levels. It raises the general understanding of the current TNA practices and management in the Iraqi construction industry. It has brought together a large body of knowledge on construction management problems in Iraq, TNA in Arab countries and combined a variety of schools of thought into one integrated model. This research integrates, refines and extends the empirical work conducted in the field of TNA in Iraq, since until the present there has been a lack of such studies in this country. It is hoped that the outcome of this research will lead to a better understanding of the need for training construction engineers in Iraq and will encourage other researchers to extend this study through further work.

DEDICATION

‘Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime’ (Chinese proverb)

To my parents, who emphasised the importance of education and helped me throughout my life and have been role-models for me in hard work, persistence and personal sacrifice. They inculcated, instilled and infixed in me the inspiration to set high goals and the confidence to achieve them. My father taught me that a person who takes responsibility with courage, persistence and conviction, while never compromising the quality of life, is a person who is capable of making tomorrow a better day than today, for himself and for the people around him. He is a person with vision and good judgment. My mother, with simplicity and unconditional love taught me that real happiness is to make people happy: by lending a hand and thinking of them. Life is a precious gift that we should cherish and invest in well; to make it worth living for ourselves and for the generations to come, we must do our best and then, the rest we leave to God⋯

CERTIFICATE OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this thesis, that the original work is my own except as specified in acknowledgements or in footnotes, and that neither the thesis nor the original work contained therein has been submitted to this or any other institution for a degree.

(Signed)

(Date)

30.09.2013

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First and foremost, I offer my deep gratitude to God. I am grateful, for he made me what I am and offered me everything I have…

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Chapter 1: Research Perspectives

1.1 Introduction

The importance of training for improving an organization's performance has long been recognised. Due to current exponential growth in technology and its effects on the economy and society at large, the need for training has become more evident than ever (McClelland, 2002; Ghufli, 2012). Improving the skills and knowledge of the workforce through training is now one of the most important agendas of most organizations in both developed and developing countries (retrieved from *http://en.copian.ca/library/research/report1/rep08-01.htm*). By encouraging necessary employee skill development training, would help companies in playing an important role in fulfilling the long term staffing needs. The workforce is one of the most important elements affecting the continuity and smooth implementation of construction projects (Adlin, 2005). Muya *et al.* (2004) reported that in the future the construction industry will require a skilled construction workforce (skilled labour) endowed with specific skills. The availability of skilled labour is a major factor in obtaining a quality product; this is also an important factor when gaining customer confidence in the industry. To achieve this, training is a key tool for enhancing workers' knowledge, skills and attitude. It is essential for employees in construction industry to be involved in training in order to keep their skills and knowledge up to date.

This chapter introduces the thesis. The background of the study and features of the existing construction industry will be presented, the research problems will be discussed, and the research aims, objectives and questions will be described. The expected contributions of the research will be indicated. Finally, the structure of the thesis will be outlined, providing brief information about each chapter, before concluding with a summary.

1.2 Research Background

At present, construction companies are making great efforts to adapt to the changing business environment and to improve their competitiveness through investment in training and development programmes (Saoud, 1996). This activity has increased all over the world in recent years; in order to justify this kind of investment it is vital to provide evidence that the value of training is fully recognised, to make sure that training leads to the desired outcomes and a tangible increase in work performance (Akhorshaideh, 2013 ; Lim *et al.*, 2006; Noe *et al.*, 2006). There is a growing realisation by companies in the construction industry of how important training programmes are for upgrading the skills and knowledge of its workforce. Construction companies are demanding greater skills from new entrants to the job market and are seeking heightened skills from workers already in the workplace (Ikediash et al., 2012). This need is particularly felt in the construction industry which has been affected by technological change in many ways (Dada *et al*., 2012; Adi *et al*., 2012). In a survey carried out by the Construction Industry Training Board (1988), with respect to training needs within the construction industry, it was found that a lack of skills at the management level was obvious and that if quality and an improved level of productivity were to be achieved, much more training was required to fill the skills gap (Saoud, 1996; Birdi *et al.,* 2008). Employees are the most important and valuable asset of an organisation and this is particularly true in relatively low-tech, labour-intensive industries, such as construction. It is often said that an organisation is only as good as its people (Bhatti et al., 2013; Green *et al*., 2004). Organisations can only achieve their objectives through their employees, and continuing education has now become the means to keep abreast of new developments and enhance workforce performance in the construction industry (Mselle, 2000). Further research by Tung-Chun (2001) also agreed that educated and well-trained employees are a precondition for an organisation to gain competitive advantage. Thus, it is important that employees should possess the required skills and knowledge in order that their companies can remain competitive and successful in the market (Green, et *al*., 2004). The formal approach for companies to update employees' skills and knowledge comes via effective training programmes. According to Cosh, *et al.,* (1998) training is investment rather than consumption; it is regarded as a tool that could help a firm's expansion, develop its employee's abilities and at the same time meet an organisation's potential, objectives and targets for profitability. Therefore, training needs have long been identified as one of the fundamental provisions within the construction industry, assisting the success of the organisation and meeting the needs of the workforce (A Enshassi, and Mohamed ,2009). Training lies at the core of creating, maintaining and developing the workforce, who contribute significantly to the fulfilment of the objectives of construction projects (Teixeira and Pires, 2006; Odusami *et al*., 2007). Training is responsible for creating skilled, qualified and capable people, who help organizations to improve their performance and adapt to change. This is why some successful organisations spend a great deal on training and development. However, some organizations often train more employees than necessary, or the training investment is "wasted" on the wrong employees. In the USA, an estimated $50 billion is spent annually on formal training, with an additional $90 to $120 billion on less structured, informal training (Broad & Newstrom, 1992, p. 5, quoted in Cekada, 2010). Therefore, scholars generally recognise that the first important phase in planning and developing a training programme is to determine the needs for such a programme within an organisation (Boydell, 1976; McGehee & Thayer, 1961).Companies are interested in providing training for their staff; this could be due the fact that companies have realised that training can help boost confidence, improve work quality and productivity, as well as improve the morale and loyalty of their staff (Lin *et al.* 2010; Yaakub, 1996). Continued learning has now become a technique for keeping abreast of new developments and enhancing workforce performance in the construction industry (Mselle, 2000). Therefore, training involves direct investment by construction companies. Because training is such a substantial investment, companies should pay significant attention to the employees' current needs before undertaking any training. To further this goal companies must decide on the best and the most effective methods for assessing the employees' current skills and needs (Sega, 2006). The process of creating Training Needs Assessment (TNA) for maintenance engineer's starts with the compilation of a list of skills which they need to possess and then comparing these skills with those they already have. The TNA package can recognise which skills and competencies are required to maintain the plant and identify where the gaps in capability lie (Hussan, 2004; A Enshassi, and Mohamed, 2009). TNA will clearly indicate who needs training and what they need training in, thus ensuring that new knowledge and capabilities are acquired through the training process. The research literature suggests that whenever training programmes are to be conducted, there needs to be an assessment of training needs which must be undertaken before anything else. Assessment of training needs should be done in a systematic manner and should be comprehensive because organizations need to understand what the training needs are before implementing training (Odusami et al., 2007). Initially, in order to remain competitive within the organisation, employees often have to upgrade their skills. Additionally, employees moving up the career ladder might need to be trained in managerial and leadership skills. This means that the employee may need to be trained in either technical skills or soft skills. TNA forms the basis for training needs that are to be identified and acted upon (Hassan, et al, 2005). Once the training needs are identified, the organisation must prepare a checklist of employees who require training. This helps the organization to develop a systematic method to assess how many employees need to be trained, in what skills and whether they have the qualified staff necessary to conduct the training (*Retrieved from www.managementstudyguide.com/training-needs-assessment.htm,*2013).There is a growing awareness that organisations and individuals benefit from training when the training and development programme is based on accurate analysis and is designed to address the right issues (Lin *et al.* 2010). TNA is the keystone to identifying the skills gaps in organisations and it is also particularly crucial in improving the skills and knowledge of employees (Hussan, 2004; A Enshassi, and Mohamed, 2009). Therefore, it is strongly recommended that all training and development programmes must be based upon TNA if they are to be effective (MMIS, 2008). The assessment of the training needs in particular skills within construction companies is important when identifying the learning needs of the workforce. Employees in the construction industry, particularly those at the management level, should possess certain skills and knowledge in order to achieve project goals more efficiently (Arshad, 1997).

With the existing employment circumstances in Iraq, and due to a new period of competition in the global market, training has become an influential tool in coping with the shortage of skilled labour and to improve the productivity of the available staff (UN-Habitat, 2007). Nowadays in Iraq, construction companies are required to train their people in order to keep abreast of the latest skills and knowledge that are needed in the field of construction. In addition, there are incentives given by the Iraqi government to promote training in the private and the public sector (UN-Habitat, 2007). In order for the outcome of training to be effective, it must first be approached systematically, which means that there are certain steps that companies need to take into account. These steps begin with an identification of training needs through TNA, which can be considered as the most important stage in ensuring the effectiveness of the planned training (Jamil, 2006). This affirmation is made based on the heavy emphasis placed by many training theorists on this phase, who agree that TNA must precede any type of training intervention (e.g. Goldstein & Ford, 2002; Salas & Canon-Bowers, 2001; Palmer, 1999; Jamil, 2006). It appears that in most Arab countries, training is believed to be the most important factor contributing to the development of their people. Murrell (1984) states that there is general agreement that one of the most important challenges facing developing countries is the training and development of their people. However, in most Arab companies training is not considered as an organisational strategy which contributes to the company's success. According to Agnaia, (1996) TNA does not always reflect the exact needs of employees because the results may be unclear, or may be distorted subject to family, kinship, tribalism or friendship ties. As a result, the application of these practices in Arabic companies in general, and in Iraq in particular, does not usually work properly; it can be a waste of time, resources and effort.

1.3 Features of the Existing Construction Industry

Du Plessis et al., (2002, p. 4) proposed the definition of construction "*is the broad process/mechanism for the realisation of human settlements and the creation of infrastructure that supports development. This includes the extraction and beneficiation of raw materials, the manufacturing of construction materials and components, the construction project cycle from feasibility to deconstruction, and the management and operation of the built environment".* The construction sector has a strategic role in development, primarily in the provision of the infrastructure and facilities that support the development of a country. The construction industry has been considered one of the most dynamic and complex industrial environments (Druker *et al.,* 1996; Tabassi *et al.,* 2011). It is a project-based industry, within which individual projects are usually tailored to client specifications, thus, due to the dynamic environment and changing demands of construction, skilled and knowledgeable teams, who work each time on a new project, are required to finish the project successfully (Druker *et al.,* 1996). This appears mostly in larger companies, which rely on skilled, knowledgeable and professional staff to manage the construction processes and lead to better customer service (Tabassi *et al.,* 2011). Despite the demand from the industry for skilled and professional staff, literature on training development within construction companies is limited, and much of the evidence relies on data gathered only over last decades (Loosemore *et al.,* 2003). For example, it was found that companies in the construction industry demonstrated a less significant commitment toward developing employees. However, the success a company, particularly a construction company, is mostly dependent upon the quality and morale of its employees. Training helps to provide a powerful approach to the development of employees in many business sectors. In the face of this, it became obvious to the construction industry that effective management and the development of human resources required a commitment to training (Tabassi *et al.*, 2011). A considerable body of literature demonstrates that the construction industry is determined to improve the performance of its labour force by updating their skills and knowledge. Due to changing technologies and increased competition in the construction industry, the requirement for well trained employees has grown. Additionally, there is an understanding that the skills of all construction workers, be they managers, designers or labourers, are regarded as the construction industry's most precious resource and need to be continuously upgraded and updated (Saoud, 1996; Imbert, 1991). This, according to Saoud (1996), is known as human resource development; such development can have effects beyond the construction industry and influence economic planning policy. These effects include technological development and the provision and distribution of resources required for construction. Hassan *et al*, (2004) have anticipated that due to the accelerating rate of technological development, many construction firms might find themselves out-dated within only a few years if continuous training is not carried out; this leads to increased training costs in the short term . Despite construction contributing greatly to economic development, its importance is still underestimated in most developing countries; this has led inefficiency, no proper policies for future development, a lack of funding, and a lack of skilled and knowledgeable workers. Companies in developing countries face many problems on the road to growth so suggestions and recommendations have been put forward to tackle these issues. However, they have not been able to overcome their problems and as a result their business environment is underdeveloped (Hassan *et al*, 2005). Evidence indicates that many construction companies do not pay the necessary attention to TNA given the growing demand for a multi-skilled workforce in the construction sector. This is due to the predominance of an engineering culture, which focuses mostly on technology instead of people and is rather disorganised in terms of staff development (Ford *et al*., 2000; Loosemore *et al*., 2003). In a number of studies it has been found that, although there are sufficient numbers of engineers involved in managerial jobs in construction, there remains a lack of soft skills in the construction industry, such as: communication, business management and interpersonal skills (Seethamraju & Agrawal, 1999; Haas *et al*., 2003; Glover *et al*., 2003; Goodrum *et al*., 2007 Wang 2008; Liska *et al.*, 2000; Farooqui *eta l.*, 2008; Khairuddin, 1995). In short, construction companies show little interest in human resource development, accordingly there is little investment by companies in the education and training of their employees .

1.4 Statement of the Research Problem

1.4.1 TNA in the Arab World, Particularly Iraq: The Research Gap

Literature reviews of TNA show that in Arab countries most organisations have difficulty in identifying the training that their employees require. Ghufli (2012) cited many researchers, such as Al-Khader (1980) and Al-Faleh (1985), who have argued that many Arab organizations lack job descriptions and clear performance appraisals, and that the approach they use for assessing the development needs of employees is ill-defined, rather than systematic. A few studies have been carried out on TNA in Arab countries for example: "*Training Needs Analysis of the Abu Dhabi Police"* by Ghufli (2012). However, these studies were not specific to TNA in the construction sector and therefore the findings have limitations. They may not be precise enough to clearly define the TNA practices in some sectors, namely construction. There is a lack of studies that investigate the three levels of TNA in relation to the effectiveness of training in Arab countries, particularly in Iraq. Agnaia (1996) found that major TNA techniques, adopted mostly in Libya, used performance appraisal systems and that performance appraisal systems were considered to be the most common and widely used methods in the TNA of managers (Brown, 2002; Osborne, 1996). In addition, Abu-Doleh (2004) researched Jordanian private and public organisations and found that much emphasis was placed on the individual and functional levels, rather than organizational analysis. Not one company in either sector used all three approaches simultaneously for conducting their managers' TNA (Sherazi *et al.*, 2011). It appears also, that no studies have been undertaken on the training needs of construction companies in Iraq, especially with respect to TNA. The existing literature on TNA indicates that most studies have been undertaken overseas. Due to many cultural differences, the outcomes of these studies may not reflect TNA as practiced in Iraqi construction companies. The shortage of empirical research into TNA in the construction industry in developing countries in general, and in Iraq in particular, is the main motive for the researcher in conducting this study. Thus, this research study represents an attempt to fill, in part, a gap in the literature on training needs assessment for skills and knowledge in the Iraqi construction industry and to increase knowledge in this area. From the academic and professional background mentioned above, it is clear that there are currently theoretical and practical gaps in the TNA programmes provided by Iraqi construction.

1.5 Aim of this Study

This aim of the present study is to develop models for assessment of the skills and knowledge needs for construction engineers in the Iraqi construction industry

1.6 Objectives of the Research

1. To conduct critical literature reviews on the theories, and schools of thought relating to construction management, training needs and the development of skills and knowledge.
2. To identify the drivers and barriers to conducting TNA in Iraqi construction organizations.
3. To explore the nature of existing TNA offered by Iraqi construction companies. Therefore, this study will try to identify the levels of TNA and the data collection methods and techniques used at each level.
4. To determine the level of importance of TNA Practices in the Iraqi construction industry.
5. To investigate the actual skills and knowledge the site engineers possesses and what skills are needed to meet the changing demands of the industry.
6. To develop a conceptual model that integrates the research findings of the training needs of employees in selected construction organizations in Iraq.
7. To test, refine and validate the model in terms of assessing training needs for construction projects in Iraq.

1.7 Research Questions

To achieve the above aim and objectives of this study, the following research questions are posed.

1- What are the existing TNA methods used by Iraqi construction companies?

2- To what extent do Iraqi construction companies perceive the importance of TNA?

3- What are the specific barriers and indicators for conducting needs assessments in Iraqi construction firms?

4- How can the levels of knowledge and skills-related deficiencies that exist in the workforce be determined effectively using TNA?

1.8 Research Methods

The research is based on modern epistemological and ontological assumptions. The research method used is quantitative in nature, and therefore it is appropriately in-line with the positivist tradition, and will be used in this study. The goals of the study determined the decision to adopt a non-experimental quantitative approach. This study adopts descriptive research and a non-experimental quantitative approach. It was decided to use a descriptive research study and also to use a cross-sectional study method. This method is a snapshot of a population at a particular time. A cross-sectional, survey based approach, is taken in the primary data collection phase of the study. The data presented is derived from a study of 239 different Iraqi construction groups' employees (Site manager, Project leader, Civil Eng and Architect. Some data thus obtained was analysed using the Statistical Package for Social Science (SPSS) software. The questionnaires were sent to targeted respondents by means of a web survey questionnaire to identify the TNA and the actual skills and knowledge needed for selected construction companies in Iraq.

1.9 Research Contributions

This study arose from the increasing interest in improving the performance of construction companies globally and in particular in Iraq, in order to achieve the desired level of sustainable efficacy. A critical review of the relevant literature on training and TNA shows that there is a need for this type of study. The literature on training indicates that this concept has been the subject of increasing interest and debate in recent years in Arab countries (Ghufli, 2012; Al-Faleh, 1990; Atiyyah, 1993; Weir, 1994; Abu-Doleh, 2000, Abu-Doleh, 2004).

As previously discussed, Iraq continues to exhibit a lack of effective training programmes to fill the skills gap at the organisational level and this deficit directly affects the competitiveness of Iraqi construction companies in the worldwide market. From the above discussion it could be inferred that the need for training in managerial skills in the construction industry is a major concern for the Iraqi construction industry. Therefore, it may be meaningful to undertake a study which is aimed at addressing these needs and identifying the most important skills and knowledge required by the construction industry. The skills and knowledge needs study offers a series of recommendations to help address the skills and knowledge gaps that have been identified. This study, through its model, aims to create a universal baseline for various skill sets which will be important as a means of communicating the common level of achievement needed within the Iraq construction industry. This study will make a significant contribution to this topic, as it is the first empirical study conducted to identify training needs in Iraq. It is hoped that it will improve the understanding of the current methods and practices of TNA and management practices in Iraqi construction firms and enrich and fill the gaps in the literature on TNA, both in Arab countries and on a more general level (Ghufli, 2012). This study can help ensure TNA and training programmes are appropriately implemented so that individual companies can identify the level of skills needed, the areas in need of change and the most beneficial mode of intervention. The results of this study will advance existing knowledge in this field in five theoretical and practical areas.

1. This study will allow construction representatives, investors, project managers, educators, trainers, workforce development policy makers and experts in the construction industry to significantly increase their knowledge of the manpower, and the educational position, within the construction sector in Iraq with regard to training programmes.
2. To the best of the researcher's knowledge, this study will be the first of its kind in the Iraqi construction industry to be undertaken. The findings will enrich the existing literature on the quality of training programmes in the construction industry and fill the gaps in knowledge of studies on Iraq in particular.
3. This thesis will provide models for TNA for identifying skills gaps and training areas, which can help to improve and strengthen development of management skills in the construction industry and might be used as benchmark.
4. This research quantitatively identifies the major benefits of TNA, at the level of individual workers and at a company project level. By emphasizing the importance of TNA, employees' development levels, goal-setting, managing change, closing skills gaps, the cost-to-benefit appreciation of training, learning motivation and management support can all be enhanced.
5. This study will make recommendations to guide Iraqi construction firms in facing the challenges of the modern world.

Overall, the results of the study will provide critical information about the training needs of workforces to a wide range of professionals: HRD (Human Resource Development) scholars and HRD practitioners; business leaders; educational scholars and leaders; as well as those who make policy for business, industry and on issues of labour. It is hoped that the outcome of this research will lead to a better understanding of the needs for training in Iraqi construction firms and will encourage others to extend this study through further work.

1.10 Structure of Thesis

- **Chapter One**: The background to the research: the justification for it, a statement of the problem, research questions, aims and objectives, research methodology and contributions to knowledge arising from the research.

- **Chapter Two**: A review of the existing literature on skills shortages, the skills gap and skills needed for project managers, training and TNA.

- **Chapter Three**: The research methodology, which will entail the use of a survey questionnaire. The data collection and analytical procedures are described in detail, as well as how the trustworthiness of this research study was determined.

- **Chapter Four**: Presentation and analysis of the results of the survey questionnaire.

- **Chapter Five**: Key findings and the development of a conceptual model of TNA.

- **Chapter Six**: Validation of the conceptual TNA models for construction engineering employees.

- **Chapter Seven**: Discussion and integration of the results of the survey questionnaires with the literature review and empirical studies.

- **Chapter Eight**: Conclusions, recommendations and contributions to knowledge.

1.11 Summary

In this chapter, the purpose of the study and the research questions were introduced. The significance of the study was covered. Key terms of TNA, skills and knowledge in construction used in the research have been defined. Thereafter, an outline of the proposed research study program was presented which is to be used to resolve the main problem.

This chapter provided a general background to training needs assessment for the construction industry. This chapter assessed the extent to which construction training in Iraq is deficient, as well as the direction of training needs for the future; an appropriate background has been created. It is almost that there is no training needs assessment in the Iraqi construction industry conducted and there is no widely used, understood and accepted model for the training needs assessment of construction workforces. Therefore, construction management education and training in Iraq should mirror the industry's needs in terms of skills and knowledge. Such skills and knowledge need to be research based and take account of the particular problems and special nature of the sector.

In Chapter Two the researcher will conduct a literature review in two parts. The review will consist of a detailed analysis of the skills and knowledge required in construction in the first part. In second part the concept of TNA will be reviewed critically.

Chapter 2: Literature Review of the Construction Industry Section 1: Skills and Knowledge

2.1 Introduction

Sustaining competitiveness is one of the most critical challenges for business organizations (Porter, 1996). Recent rapid advancements in technology, information and trading have led to changing business conditions. These constant changes require organisations to focus on being competitive, in particular, in relation to the competitiveness of their workforce. An efficient workforce is considered to be one of the most significant resources for improving business quality (Swanson & Holton, 2001). The need for improved quality on construction projects highlights the requirement for a more efficient workforce. Consequently, assessing the skills and knowledge of the construction workforce has been considered essential in construction companies worldwide, especially those in developing countries. The skills and knowledge areas that require specific training need to be identified in order to keep the construction workforce abreast of new developments in their industry (Teixeira, 2006). Therefore, Training Needs Assessment is likely to play a major role in the development of the workforce's skills and knowledge.

This chapter will focus primarily on providing a theoretical perspective on skills and knowledge and the concept of TNA. This chapter presents a review of the related literature which has assisted in producing an appropriate model for each of the groups included in the proposed study: site managers, project managers, civil engineers and architects. A review of academic concepts related to empirical research evidence has provided a picture which has helped to design a conceptual model for this study. The literature reviewed comes under several different subtitles i.e. skills, knowledge, training and training needs assessment. In the first part, this literature review gives a comprehensive view of knowledge and skills as they may be applied to construction firms in Iraq; in the second part it covers the history of training and TNA. Furthermore, successful models are selected regarding the training needs of both employers and employees. Managerial techniques that contribute to identifying the training needs' gaps in the Iraqi construction industry are also identified.

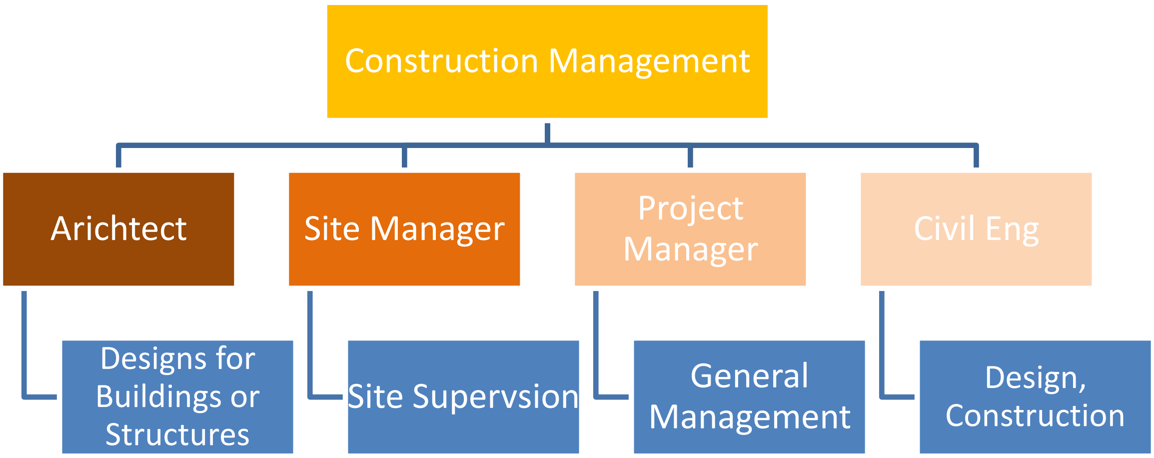
2.2 General Pattern of Construction Management Structure

In the past the construction industry, with its different specialisations, relied very much on a large workforce; these days things are quite different: technology has reduced the dependence on human resources and as result, attention has shifted to creating a more competitive and skilled workforce in the construction industry (Abd El-Hameed, 2003).One result of developments in the construction industry is the improvement of the knowledge and skills of the employees who are working in this industry. In order of decreasing importance, the human resources of the construction industry are: engineers, technicians, experienced skilled labourers and ordinary labourers. Thus, the engineers are considered the key pillars in the construction industry (Abd El-Hameed, 2003). Therefore, if companies develop and train their engineers in the most recent technical methods and up-to-date knowledge, this will of course help to develop the construction industry (Hassan et al, 2005).

At first glance, the roles of modern construction engineers are relatively varied; this could be due to different working positions in companies and educational background. Unfortunately, in practice, it is not that simple. Construction projects, nowadays, have become more complex, both technically and managerially. Designers are using a greater number of specialists to help them design the details of the building. Therefore, there is a vast range of components to be brought on to the site and fixed using a wide range of specialist skills (Bloomberg, 2005). Clients, contractors and sub-contractors are developing an increasing sophistication with regard to money management, thereby creating a greater awareness of the financial implications of the way people deal with each other, and consequently, the risks they are prepared to take (Odunsam et al., 2007; Arshad, 1997). There are also changes in commercial practices, new contractual procedures and a shift in social attitudes. Training and skills in all engineering roles are mainly the same, that is, fundamental scientific knowledge of physical principles and mathematics. On the other hand, it can be seen from research that construction engineering management roles require different educational preparation and training for skills and knowledge (Hassan et al, 2005; Odunsam et al., 2007; Arshad, 1997).

It was found that emphasis is placed on the management roles; primary attention is given to planning, organising and labour problems, and relatively little to abstract scientific principles. Between these two boundaries, we find the other functions with varying degrees of emphasis on research or managerial oriented concepts (Abd El-Hameed, 2003). The skills and knowledge needed by the engineers, the main focus of this research, are particularly important to the rapidly changing environment and processes of the Iraqi construction industry. The construction engineers should possess certain skills and knowledge to manage projects more efficiently and meet objectives (Hassan et al, 2005; Odunsam et al., 2007). Engineers in the construction industry must be skilful, both in the techniques of construction and in the management of construction operations; for example: the site manager is responsible for the planning, coordination, and supervision of the entire production process and for the completed facility's adherence to the projected plans and specifications (Hassan et al, 2005). An analysis of the present and future skills of site engineers in Iraq will eventually lead to their training needs. This is the main objective of this research. Within the Iraqi construction industry management we find four different groups. Figure 1.1 below shows the general pattern of the Iraqi construction industry management structure.

Figure 2-1 General pattern of Iraqi construction management structure



Adopted by researcher

The most common major participants in the construction industry include the site managers, architects, civil engineers, project managers and general contractors. These groups form the professional body of the construction industry. However, this professional group in developing countries, such as Iraq, is generally the least advanced in the construction industry and much construction is carried out without these professional groups. For example: the architect and designer are often poorly suited to construction companies and overlapping roles between the technical and managerial teams contribute to weakening construction performance in developing countries. This lack of collaboration within construction companies and poorly divided roles further slows the success of construction companies in developing countries (Jahanger, 2013). There has been no empirical study of the Iraqi construction industry to find out and determine if there are signs of continuing skills-gap problems across the different professions in the workforce (UN-Habitat, 2006). However, critics frequently argue that most workforces in developing countries, particularly in developing countries, are found to lack technical and practical skills, whereas managers and professionals tend to lack management and team building skills (Hassan, 2008).During the construction boom of 2003, the employers' solution to the shortage of any type of skilled labour was to increase the remuneration of the workers. This, of course, contributed to the rise in cost of construction (UN-Habitat, 2006). In many instances, in the face of an inadequate supply of skilled labour, projects have had to make do with inferior labour or, in extreme cases work has had to stop altogether (Bloomberg, 2005).

2.3 Skills and Knowledge in Construction: Definition and Characteristics

The major tasks in construction management include planning, organizing, scheduling, implementing, managing, monitoring, controlling, and tracking construction projects. Construction engineers must learn about the various areas of project management (Baharudin, 2006; Egbu, 1999). These skills and knowledge, when imbibed by a construction professional, can produce better results. Young (1989) identified skills and knowledge in organisation, human relations, communication, personnel management and operational planning to be the most important in the practice of construction management. Baharudin (2006) cited other skills required, such as technical skills and managerial skills. The shortage of skilled workers is one of the greatest challenges facing the Iraqi construction industry. The construction phase is divided into four resource categories: management, capital, labour and materials. These recourses are abundant in developed countries. However, in developing countries, for example Iraq, management workers are in very short supply. This is likely due to the lack of management training in Iraq. Love *et al.* (2001) suggest that the complex nature of the construction industry, together with the challenges of global competitiveness and changing technologies, calls for urgent training programmes to develop employees with the skills and knowledge needed to make them more competent within the industry (Adi,*et al.*,2012). They also argue that employees in the construction industry must have these critical skills and knowledge, to enable them to work successfully with others in the management of a construction project. Therefore, training needs in the construction industry have increased sharply due to a need to maintain a skilled and competitive workforce, particularly at management level (Chileshe & Haupt, 2007). Due to globalization, in recent decades, the importance of skills in the construction industry has become a most sensitive subject within many construction firms. Hence, TNA has become a priority with the need to fill the skills-gap and to improve employees' current skills (Love *et.al* 2002; Chan, & Dainty, 2007; DfEE, 2000; Mackenzie *et al*., 2000; Allen, 2004). If employees want to be competitive and successful in the highly dynamic construction business environment, they must demonstrate a range of technical and generic skills (Lange et al., 2006). In recent decades, there has been much debate about the skills and knowledge that the construction engineering workforce should have to enable them to pursue a career in the construction profession (Dada et al., 2012; Mulya *et al*., 2004). The need for skills and knowledge by the construction industry is well established (Odusami *et al*., 2007; Charlesraj *et al*., 2004; Gushgari *et al*., 1997; Whetten & Cameron, 1991; Egbu, 1994). Furthermore, it has been acknowledged that skills and knowledge are indispensable; not only to signify competence, but also to promote a professional image of the construction industry (Young & Duff, 1990; Dada et al., 2012). The construction industry requires a skilled and knowledgeable construction workforce. But what are these skills and knowledge?

2.3.1 Skills in the Construction Sector

Highly skilled individuals are important for the construction process. The construction industry requires individuals with basic knowledge and skills. To achieve this goal, employers within the Asset Skills Sectors must ensure that their employees have the necessary knowledge, skills and experience required to undertake their duties competently. This can be ensured by embracing the concept of training needs assessment. This allows employers to review where employee training may be lacking and thus informs them on any gaps that need to be rectified. Empirical research study conducted by the Information Technology Governance Institute (ITGI) that there were 700 chief executives and chief information officers at companies in 23 countries, including the UK participated in the survey focusing on information technology employees, it was found that 38% reported problems relating to inadequate skills in the construction workforce (Hasan, 2008, Ashford, 2008). In the modern business workplace, efficiency has become a priority for employers worldwide. Saving money and boosting efficiency at the same time has become a must, particularly since the arrival of the recent global recession. Completing a training needs assessment allows organizations to stay on top of employee development, channel their resources effectively and prepare for future needs. The quality of the labourer's education and training is the secret factor of the success of the construction industry in each country, and the demand for a skilled workforce will only increase in the future (Mulya *et al*., 2004). Several studies (e.g. Odusami, 2002; Odusami *et al*., 2007; Charlesraj *et al*., 2004; Gushgari *et al*., 1997; Mulya *et al*., 2004; Farrell & Gale, 2003) have demonstrated that the fundamental skills to improve the performance of the construction industry are urgently needed. These skills may relate to organizational, managerial and technical roles. While it is accepted that certain technical and practical skills are necessary within the industry, the range and scope of skills needed can vary widely between firms. Skills in the construction industry are defined by Odusami (2002, p 61) as: *'the ability to perform the task well or better than average. Skills can also be described as the ability to translate knowledge into action'.* However, some literature reviews reveal that the meaning of the word 'skill' would differ with the context in which it is used, for example: Shah and Burke (2003) define 'skill' as 'applied competence'. Applied competence is the overarching term for three kinds of competence:

- Practical competence: our demonstrated ability to perform a set of tasks.
- Foundational competence: our demonstrated understanding of what we or others are doing and why.
- Reflexive competence: our demonstrated ability to integrate or connect our performance with our understanding of that performance so that we learn from our actions and are able to adapt to changes and unforeseen circumstances.

As a skill is related to a particular task, an employee who does not possess such a skill is unlikely to perform the task as effectively as an employee who possesses the skill. The key to identifying a skills-gap in a given occupation is that the gap can be addressed through a proper training programme (Toni, 2009). However, a research study by (Hassan, 2004) claims that training is not always a solution to address a skills problem or performance gap; that this problem would be solved by the right recruitment and selection programmes and that through work experience employees can develop their abilities. On the other hand, Toni (2009) suggests that skills are normally associated with a qualification and its achievement through formal education and training. In the construction industry, the engineering workforce at all levels requires different technical and managerial skills, and training is the only tool that can be applied to develop individual technical and managerial skills. This call for specific training in the relevant management and technical areas is support by Teixeira (2005) who claims in his research study that the need for training in these areas has been felt in several countries in Europe, especially in the UK, who have greatly expanded training to address the skills problem.

Katz (1974) proposed three types of skill as an approach to categorising them in construction. These are technical skills, human skills and conceptual skills. Technical skills relate to objects, human skills relate to people and conceptual skills are associated with ideas. These three concepts have implications for the implementation of skills development. Katz said that the workforce requires the same level of competence in all skills. Skills needed to drive the development, or use of technology, are reported primarily at higher occupational levels, such as in managerial, professional, associate professional and technical occupations (Devi & Mallika Rao, 2012; Rizwan, 2008). Apparently, nowadays there are also certain skills in the construction industry that are more important than others. If the skills are less important and the employees do not have those skills then the training needs gap will be less. It appears that the number of skilled construction workers qualifying in Iraq over the forecast period will be less than the number required to achieve the level of projected output over the period of reconstructing the country. This shortage consists of all kind of engineers such as project managers, site managers, professionals and skilled workers. Among the recommendations put forward to deal with issues affecting the construction industry are:

- Increasing the level of training programmes in project management and supervisory skills.
- Examining the changing roles of managers in the industry and the implications for education and training provision (UN-Habitat, 2006).

A good TNA will also look to the long term as well as identifying the skills that will be needed in the short term. By providing training in these skills in good time, the organization is able to anticipate needs and have the necessary skills in place by the time they are required (Hassan, 2008). It seems that in Iraq construction labours at the level of skilled labours, in desperate need of the kinds of essential skills. For example: most Iraqi engineers possess very poor project management skills; this could be due the predominating engineering culture that only focuses on technical skills rather than managerial skills. Though the availability of construction engineers with managerial skills in the Iraqi construction industry, in terms of numbers is not much at a broad level, it is the quality of the workforce both in terms of knowledge and skills which is not appropriately matched to the requirements of the construction industry in Iraq. This is why one of the main areas at the industry level, where considerable gaps exist nowadays, is the availability of skilled engineers (UN-Habitat, 2006). This also leads to lower productivity of the construction sector in Iraq as compared to other nation's productivity in this industry. A major criticism (Jahanger, 2013) facing the Iraqi construction industry is the growing rate of delays in project delivery, which could be attributed to the lack of skilled employees. Therefore, it is assumed that in Iraq there is an increased need for a wider variety of skills in the construction industry, including the ability to address not only technical, but also managerial issues; this is due to shifts in technology, new materials and radical changes in production that require different skills from employees. However, the skills required could be different from industry to industry or due to cultural factors, or the nature of the business environment in which they are needed. In Iraq, indeed in most of the developing world, one of the key constraints to achieving the best possible construction performance has been a lack of skills management. In a dynamic environment such as Iraq, construction managers in particular need to combine leadership, entrepreneurial and administrative skills with technical know-how to meet the challenges that the changing socio-political, economic and technological landscape presents (UN-Habitat, 2006).. Without a good combination of management skills and technical skills, it would be impossible to improve efficiency, effectiveness and responsiveness in the delivery of construction projects. Following are the main skills that have been identified to be prerequisites for the success of any company, and could be regarded as essential for Iraqi construction engineers.

- **Technical skills**

Technical skills refer to the ability of an individual to use the knowledge or techniques of a specific discipline to achieve ultimate goals. A good example of such skills is knowledge of the accounting, engineering or logistics and planning used to perform a task (Brink, 2007). According to another definition by Karz (1983), technical skills are defined as an understanding of, and proficiency in, a specific kind of activity, particularly one involving methods, processes, procedures, or techniques. It involves specialized knowledge, analytical ability within a specialty, and facility in the use of tools and techniques of a specific discipline. Technical skills deal with 'things', and involve processes (or techniques), knowledge and proficiency (Enshassi *et al*, 2009). Technical skills are learned in the specific disciplines of the various engineering specialties such as: design skills, programming skills, production skills (Alexis, 2007; Razalli, 2007). Shehu and Akintoye, (2008) suggest that the technical skills required to use specialised tools, methods, processes, procedures, techniques, or knowledge involve specialized knowledge, or analytical ability within a specialty (Shehu & Akintoye, 2008; Razalli, 2007). Cross (2000) argued that as individuals move away from their technical specialization into managerial positions, they also move away from the use of specialized tools and towards the use of specialized knowledge bases and cognitive processes. According to Razalli (2007), in order for a project to be successful, employees should have relevant experience or knowledge of the technology and analytical techniques, or in the use of the tools and techniques of the specific discipline, e.g. construction engineering systems. In general, being an engineer working in the construction industry requires a sound knowledge of technical skills, for example: the ability to understand basic production processes on the construction site. However, as a construction engineer is promoted up the management ladder, fewer technical skills are required as they become more involved in managerial tasks.

- **Conceptual Skills**

Conceptual skills involve the formulation of ideas and concepts. They are referred to as the mental abilities that allow employees to understand the communications between different work units within an organization, for example: the effect of any changes in any part of the organizational system, and how the organization fits into the supra-system (Shehu & Akintoye, 2008). According to Razalli (2007), "a conceptual skill is the ability to see the enterprise as a whole and recognize how the various functions of the organization depend on one another and how changes in any one part affect the other*"*. Razalli (2007) argues for the importance of conceptual skills at different levels of project development, especially at the planning and implementation stage of a project. According to him, such skills will help the project manager to understand the numerous activities involved in project tasks - the sequencing and timing of activities and the resources and facilities required in performing and completing activities. What is more, these skills can also help employees to see how, for example, changes in the design or scope of the project will affect the budget, schedule and overall performance (Razalli, 2007; Ling Jenung, 2003).

- **Enterprise Skills**

Enterprising or entrepreneurial skills relate to the ability to be innovative, creative and solve problems. Williams (1999) draws a distinction between creativity as, '*findings, thinking up and making new things*' (knowledge for its own sake) and innovation as, '*doing and using new things*' (creation of new wealth) seeing entrepreneurs as, '*catalysts for change by converting opportunities into marketable realities*' (Mauzy *et.al.*, 2003). Hasan (2008) reported that "innovation is the act of creating something new and worthwhile; entrepreneurship is the act of carrying an innovation to market in a commercial manner". It is often about taking an idea that is obvious in one context and applying it in a not so obvious way in a different context.

- **Business skills**

Razalli (2007) argues that practical business skills are necessary for an organization to achieve a corporation's objectives and targets through competitive advantage, and to engage in the creation of processes and systems to benchmark, learn and ensure continuously improved performance and betterment. Business skills include the planning, monitoring and controlling of the financial wellbeing of an organization with the view to maximizing profit (Razalli, 2007; Ling Jenung, 2003; Baroque *et al.*, 2010). The following aspects are categorized as business skills:

- Budgeting
- Cost justification
- Knowledge of building codes and regulations
- Customer/client satisfaction
- Planning - setting strategies, tactics and objectives
- Systems, processes and technological integration

- Knowledge of health and safety regulations
- Marketing to clients - developing client relations
- Construction trade knowledge

- **Project Management Skills**

According to Razalli (2007) project management skills refer to the multi-faceted responsibilities necessary to plan, monitor and control all aspects of a project from conception to successful handover, in line with the client's requirements, one's own organizational objectives and the implementation of best practice. Construction organizations sometimes fail to recognise the value of project management skills for employees. A major reason for this is that, too often, training is viewed tactically rather than strategically. It is not connected to overall organizational goals and strategy (Daniels, 2006). The following are important elements involved in project management:

- Cost estimation (conceptual)
- Project planning and scheduling
- Critical path management
- Project progress assessment
- Detail estimation
- Resource acquisition
- Schedule development - adjusting to maintenance schedule changes
- Project organization

- **Interpersonal Skills**

Hasan (2008) defined interpersonal skills as referring to the ability to work with people, solve conflicts, understand people, and deal with people-related issues (Brink, 2007). Employees who work for organizations must have the ability to perform in a competent manner interpersonally, and they also need to learn the techniques of good listening, honest and open communication, delegation and conflict resolution to get the work done and keep the whole movement/organization/project functioning well (Razalli, 2007; Larson, 2002; Shehu & Akintoye, 2008). At all levels of management, organizations need these skills in order to interact and communicate successfully with other people (Razalli, 2007; Ling Jen Ung, 2003). Thus, interpersonal skills are required at all levels of management, in order that team members may be led, motivated and influenced. Included in interpersonal skills are the understanding of behavioural principles, interpersonal relations, motivation and communication (Shehu & Akintoye, 2008). These skills are established by the way the manager perceives and distinguishes the attitudes of his superiors, equals and subordinates, and the way he behaves accordingly. Any manager could use interpersonal skills to influence other people's behaviour in order to achieve the objectives of projects by the access he/she has to various sources of power and the corresponding methods by which others may be influenced (El-Sabaa, 2001; Razalli, 2007; Ling Jenung, 2003).

Based on the comparative analysis of other studies (Razalli 2007; Hassan et al., 2004; Mulya *et al*., 2004) researchers found that the importance of different skills is perceived differently by different industrial backgrounds. For example: in the banking, hospital or construction sectors the same skills will be ranked differently due to the different business or work environments in which these companies operate. These skills can be interpreted differently according the business. Take, as an example, technical skills, these are sometimes regarded as part of project management skills; however in the construction industry technical skills refer to the ability to understand basic production processes in construction and drawing. In general, it is often said by researchers (Razalli, 2007; Hassan, 2008) that interpersonal skills are perceived as the most valuable skills, not only in construction, but in all management disciplines. Interpersonal skills are most important for management. Observation of othersstudies (Egbu, 1994; Odusami *et al*., 2007) shows that interpersonal skills, i.e. communication and technical skills are the most valued skills for all levels of construction personnel involved in managing construction work. In relation to the current study, in addition to these skills, project management would be also ranked as one of the most important skills by Iraqi construction engineers, because there is a noticeable of lack of training institutions in Iraq that could provide these skills for the construction industry.

The term skill, viewed subjectively, when applied to employees in developed countries (Teixeira, 2006; Teixeira et al., 2006) connotes knowledge and/or possessing certain abilities. Both of these qualities are more or less acquired by people through education, training and/or experience at work. However, when viewed objectively skills may also refer to the requirements of a job, in which case it is best viewed as a property of the task rather than a virtue of an individual. Within an occupation, of some sort or another, skills often denote prestige and/or social status, which may loosely be associated with the practitioners' abilities and/or tasks they perform; perhaps there is a correlation. This latter quality, when judged systematically, manifests itself through a dimension of time, and through the application of ones' expertise, being evident as a practice (Teixeira, 2006; Teixeira et al., 2006), in this context, is a value related to the maturity and/or the manifestation of skills. Therefore, one could say that the instance of the application of one's own abilities or qualities is the bases upon which an expert could show off the skills he/she has. The previous argument may hold in stable developed societies, but not in a society of different qualities. For example, in certain situations, such as prolonged wars, the presupposed basis of the previous argument doesn't hold sway. The skills base could suffer, due to the impact of war on society, for example, through annihilation or migration and the ensuing drain on expertise. This scenario is very evident in today's Iraq. To list, in an un-conclusive manner, the reasons for this statement one could cite the following wars: the war with Iran from 1980-1988; the 1990-1991 war with Kuwait; the subsequent war its allies, in what is called the first gulf war and the last war brought by America and its allies to topple the regime. These wars have had a big impact on society as a whole: the economic sanctions that followed the second war; the brain and skills drain due to refugees, and the sub-standard training, re-training and education that have tarnished Iraqi life and become a feature of these events.

Being a subjective issue, an inherent social factor comes to bear when one compares different skill requirements and abilities. Different societies have different standards as to what they call expertise, this could be tied–up, for example, and with how advanced a society is, an electrician in Japan would have different skill requirements to that of one in a society that doesn't have electricity in the first place. Another presupposition is that of culture. Culture plays a stronger role in family-based or tribal societies (Al-Faleh, 1990; Atiyyah, 1993).A culture where the role of family, or clan, is supreme may put less stringent constraints on a worker from within their ranks, than that of another clan. Therefore, and for the issues that were just raised, above, the definition and the qualities associated with skills would have a different sense, meaning, and aspirations in different situations or societies.

2.4 Knowledge Required in Construction Site management

In the business world these days, enormous amounts of data and information are filtered through organizations. The understanding of data and information in relation to knowledge has often caused confusion for the management and at worst has resulted in knowledge management project failures (Davenport and Prusak, 2000). The most important steps in improving productivity in the construction industry involve eliminating incompetence in the construction workforce and addressing this lack of knowledge on the part of the construction workforce. So, what is knowledge? Constable (1988, p.123) sees knowledge '*as the received concepts, ideas, theories, schools of thought and even traditional wisdom about management functions and problems'*. The knowledge required is an understanding of the key construction principles used in each discipline and how they are applied in construction projects (Tatum, 1999). There is growing confirmation that firms are increasingly investing in knowledge in construction. However, construction companies have historically not managed the transfer of project information well and have not effectively developed a project management learning culture (Ribeiro and Ferreira, 2010). This may be due to the lack of training development in construction knowledge management (Maqsood et al., 2006). Knowledge in construction could be defined as a process of acquiring, creating, sharing, utilizing and storing intellectual assets and other stimuli from the internal and external business environments that facilitates an organization's performance successfully (Pathirage *et al*., 2005).

Pathirage *et al*., (2005) say that the importance of the construction workforce is highlighted by the fact that industry relies on skills, and the capacity to bring different skills together effectively. Thus the concept of the knowledge worker has long been significant to construction companies (Green et al, 2004). Construction engineers who work on construction sites should possess sufficient knowledge to be able to demonstrate good performance and to make effective use of contract documents, drawings, and specifications as the starting point for their work (Persson, 2010). The greater range of duties and responsibilities imposed upon future construction workforces will require the re-structuring and development of training to meet the changing trend towards selection of personnel based upon educational achievement, rather than experience alone. Odusami *et al.* (2007) stated that, as in any field of management, site management connotes six stages of management: forecasting, planning, organizing, motivating, controlling and communicating. However, by some, site management is viewed differently to other management functions. For example, Hatchett (1976) stated that site management is not a primary occupation within the construction industry. Construction workforces with site management responsibilities need to have some experience to be able to fulfil relevant positions within the industry. After spending some time in these positions, they will have developed that faculty, and are therefore able to satisfy the expectations that come with these industrial roles (Odusami *et al.*, 2007). There is inter-dependency between the six stages of management and faculty, expectations, and the educational programmes that may come with the job, as well as work-experience programmes. This needs careful consideration; the major responsibility, which comes with a site management job, is the fulfilment of the contractor's obligations, as per contract conditions, that relate to the project (Odusami *et al*., 2007). Hence, the construction engineer's on site management needs to complete all the requirements, as expressed in the terms of the contract and shown in the drawings; the totality of which are expounded in the articles of the agreement. The construction site engineer needs to be satisfied with the quality and adherence to standards after approval, by the supervising officer, of all the tools, equipment, materials and drawings and their suitability for the process of completing the project. Resources, such as time, cost and availability of a proper labour force throughout the project, as well as the overall value of the work being carried out must be taken into consideration (Obiegbu, 1991).

From a slightly different point of view, construction site engineers should also be familiar with the following: building standards and regulations, and building methods and materials (Kiwi Careers, 2002; Odusami *et al.,* 2007; Arshad, 1997; Gunawardena & Jayawardane, 2002; Mustapha, 1990). These authors made further suggestion that engineers on construction site needs to be able to read building plans and diagrams, and to purchase – after quantifying and assessing the quality and suitability, with cost control in mind- the building materials and machinery needed for the work, as per job items and time schedule requirements. They also noted the possibility that the construction site engineers might need to use planning software applications, should there be a need or a requirement to do so. Also, engineers in different position on the construction site need to be aware of, and implement, the safety precautions needed on building sites for given methods and procedures, as well as implementing quality control checks throughout the project by establishing some kind of a fit-for-purpose system that checks all aspects of the project. In addition, these authors stated that the construction site engineers need to put an administration system into place, for the control, management and supervision of everything related to the completion of the project (Construction IT, 1996; Mohamed & Anumba, 2006). Knowledge of construction site management is, therefore, seen as a key area where money is made or lost and where there is considerable scope for improving efficiency, productivity and quality. Illingworth (2000) views the construction process as a combination of two fundamental activities:

- Knowledge of handling materials and equipment.
- The skills of the workforce in the positioning of the materials and equipment (assembly) to produce the desired whole.

The above overview on the roles and the responsibilities of construction site engineers touched briefly on some of the issues and challenges faced by the construction industry. Obvious challenges are the training of existing employees and the recruitment and training of others in order to satisfy the needs of any project within the scope of the firm's speciality, thus avoiding missed opportunities due to a lack of resources. Before training, some sort of an assessment of the required training needs to for a particular job must be carried out. All this is to raise the standard of skills up to the level required for the job (Hassan & Stepheson, 2004; Odusami *et al*., 2007). The fragmentation of the construction process, with increased specialisation and involvement of many interested parties and actors calls for training programmes for their staff in order to improve their skills and knowledge, and eventually to lead their competitors towards a shared format for creating, converting, and exchanging knowledge (Persson, 2010; Mselle & Manis, 2000). The Chartered Institute of Building (CIOB, 1995) identified areas of knowledge where training is required that were also found in the research literature: these areas are tabulated below in Table 2-1.

Table 2-1 Knowledge needs in construction site management

Working knowledge	Definition
1- **Site Management administration** ***Mohamed, and Anumba, (2004)***	General management, organization site office management, site cost control, personnel selection of operatives, workmen management, working rules agreement, safety training.

2- Knowledge production *Mohamed, and Anumba, (2004)*	Collected throughout the life cycle of construction; planning, design, construction and maintenance. Embedded in the procurement process, estimating & tendering process, material management process and construction method process. Key factors to produce knowledge of end product are: type of clients, market characteristics and end product type (standard, traditional and innovative). Impact: creative problem solving suitable to be used in long-term partnering project arrangements.
3- Knowledge of Processes. *Mohamed, and Anumba, (2004)*	Collected through best practices and bench marking efforts. Knowledge of construction methods, site lay out, use and maintenance of equipment and plant, concrete technology, estimating and site cost control. Impact: Optimizing operations & increased efficiency
4- Construction Technology *(CIOB, 1995)*	General building technology, including concrete technology, technical drawing, structural engineering, electrical installation, settings out and levelling.
5- Design – Knowledge *(CIOB, 1995)*	Design techniques, tools, and principals involved in production of precision technical plans, blueprints, drawings and models.
6- Public Safety and Security *(CIOB, 1995)*	Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions. This considers the safety policy; COSHH and CDM regulations, insurance and building regulations

2.4.1 Construction Site Management Problems

A severe shortage of all kinds of skilled labour, particularly professional technicians and managers leads to a heavy dependence on imported labour and the inadequate development of the local contracting industry. Local contractors, where they exist, operate only on the smallest projects. This engenders little or no competition for construction contracts, which in turn leads to dependence on foreign contractors and, once again, high prices. There are several challenging engineering and management problems that occur on construction sites. These problems affect time, budget plans and specifications (Trauner, 1993), and often cause defects, disputes and delays (Clarke, 1988). Ofori (1994) epitomizes the problems facing the construction industry in developing countries, saying that *'most developing countries have abundant human resources. However, they face shortages of skilled construction personnel owing to inadequate educational and training facilities and programmes. Construction enterprises show little interest in human resource development; they adopt casual employment practices. The level of technological development of the industries is also low. This is due to inadequate R&D facilities and programmes, poor linkage between research and practice and foreign exchange difficulties which hinder the importation of equipment and spares'* (Ofori, 1994. p1). Many construction site procedures and methods have not changed over the years and the same mistakes are being repeated (Holroyd, 1999). The main reasons are because site management is characterized by high work overload, long working hours and the need to deal with the many conflicting parties, including management of sub-contractors and liaising with clients (Griffith and Watson, 2004). The problems identified within site management practices can be grouped into four main categories.

- **Site Management Administration Problems**

The knowledge management of site operatives in the construction industry tends to be very much neglected (Larsson et al. 2005). Lack of management or poor professionalism has led to low industrial performance, generally. This is confirmed by research showing that construction firms are now seeking professionals with better management and leadership skills (Toor & Ofori, 2008). However, lack of management at the construction site may cause additional problems such as site conflicts between the management and operatives. Most construction sites have policies laying down procedures for the site manager to follow, with respect to management and administration problems. Mselle (2000) identified leadership problems that existed on construction sites, stemming from there being a state of uncertainty and confusion among the site hierarchy over duties and responsibilities. Also, practicing professionals in construction are hardly ever seen as leaders (George *et al.,* 2007; Toor & Ofori, 2008).

- **Technical Problems**

The use of plants and machinery by most construction companies has been less than that of the manufacturing industry (Proverbs *et al*., 2000), this is due to its labour-intensive nature. However, there has been an underlying trend towards a greater use of equipment in construction. The scale of modern construction work and the demand for shorter construction times makes the extensive, and efficient, use of equipment essential. Down-time of equipment needs to be minimised to ensure that a return on the investment is achieved. Many construction organizations have tried to avoid maintenance of construction plants and plant management costs by carrying out minimal maintenance: this has often resulted in unexpected breakdowns, lost production or inefficient machinery (Ogunlana & Olomolaiye 1989; Harris & McCaffer, 2001).

- **Communication Problems**

Problems due to a lack of, or poor communication skills, such as the inability to communicate effectively at site level and with other parties involved in the contract, occur frequently. This can have ripple effects across concerned parties (Mselle, 2000; Price, 2009). The nature of the relationships inherent in the construction industry is the main factor behind poor communication: it is a result of the historical development and fragmentation of trades, professions and responsibilities. In many cases, the top management do not know what is happening on site (Tah & Carr, 2001; Barber *et al*., 1999). Communication difficulties often occur during the construction stage because it is then that the amount of information available to all parties reaches a peak.

- **Lack of Skills and Knowledge problems**

Construction site employees need to know the building standards and regulations, how to read building plans and diagrams and how to use planning software for the quantity, quality, cost-control and purchasing of building materials and machinery. They need to know the safety methods and procedures used on building sites, as well as about staff management, quality control systems and how to organise administration systems (Kiwi Careers, 2002; Farrell, 1998; Odusami *et. al*.; 2007). A considerable body of research has suggested that construction projects help to make a large body of knowledge available to construction organizations (Ribeiro, 2008). In the context of site management, site managers and other professionals take decisions equally and solve new technical and complex problems by using their expertise and judgment in order to find prompt solutions (Ribeiro, 2008; Renzl, 2006). Problems in construction site management that are associated with a lack of knowledge and skills can be summarised, firstly, as those related to appreciating or understanding the task and planning strategies to accomplish it. Such problems can be, for example: the site manager's inability to draw up monthly or weekly plans to monitor and control progress, thus causing delays; or a lack of a project's progress and an inability to assess the status of the site and to take necessary action to avoid delays or conflicts. Secondly, there is the problem of misinterpreting documents, such as misreading drawings or work programmes, the misunderstanding or misreading of contract documents and specifications, and the misunderstanding of buying schedules. The final problems are those of issuing unclear and confusing instructions and a lack of appreciation of time management. Employees with good knowledge and skills can avoid repeating past mistakes by identifying best practice, lessons learnt, and by identifying the solutions to problems that arise on site (Mselle 2000). Construction companies are faced with the problem of getting adequate work to remain viable (Harris & McCaffer, 2001). Therefore, they need to solve the issues outlined above so as to be more competitive and attract more work. Construction companies need to pay more attention to the development of a new type of future project leaders, by assessing the skills needed by such leaders and implementing programmes, accordingly, for them to materialise, and then to maintain their skills by providing training programmes. These problems have to be addressed in order that project objectives are achieved. Additionally, there are a wide range of constraints that could occur on site, and site managers should be prepared to deal with them in a systematic and efficient way. This is only possible if the project managers, or site managers, have been forewarned or trained to deal with the unexpected.

Similar to many developing countries, the Iraqi construction industry faces severe problems in its construction site projects including: high construction costs, lack of site management in construction work projects, lack of skilled and knowledgeable people, and low productivity. All the above could contribute to the reluctance of firms to invest in the training and development of the workforce. A report by the ITDG (Intermediate Technology Development Group) (1990) indicates that the construction industry, at the technical level, lacks craft and management skills. Evidently, the construction sector in developing countries is bedevilled by a lack of technical knowledge and management and entrepreneurial skills (Ebohon & Rwelamila, 2001), in both the labour force as well professionals, due to the inadequacy of educational and training programmes (Moavenzadeh, 1978; Zawdie & Langford, 2000). These attributes owe much to the fact that most construction firms are owned and managed by sole-trader type entrepreneurs with little knowledge of the workings of the construction industry (Ofori, 1991). The impact can be seen in the rigid adherence to management techniques and practices inherited from colonial times which have remained fixed and never been tailored to the needs of developing countries (Ebohon, 2002). Moavenzadeh (1978) calls for the upgrading of the existing professionals and their educational programmes which may need reorientation in order to lessen the distinct separation between professionals and contractors. The World Bank (1984) pointed to the need for training in management for both contractors and supervisors of projects with a great deal of technical assistance required for long periods of time (10 years or more). Efforts to train managers in Iraqi made. These efforts, however, have not been successful as they are not tailored to suit the local and culture conditions in the developing countries (Un-Habitat, 2007). Additionally, the dominance of the informal sector in construction has led to a general level of poor knowledge with reduced opportunities for acquiring skills through training and proper apprenticeship (Wells, 1999). However and despite all these constraints on skills development, the labour force in developing countries is willing to develop and adapt to difficult working conditions (Datta, 2000). The responsibility for the worker's training must be shared by government agencies, companies' and workers' (Moavenzadeh, 1978).

Literature Review of the Construction Industry: Section 2: Training Needs Assessment

2.5 Training in Construction

There have some indications coming from literature that training's nature has changed. This is so in the public and the private sector alike. Training and education might sound the same, but training, traditionally, focused on the job at hand, where by education is of a multiple jobs nature. Moreover, training was considered limited to the technical skills and abilities needed by practitioners of that particular job, while education catered for a broader scope. Another difference is that, traditionally, institutions of higher learning provided the education. Also, from chronological point of view, education preceded training. However, there seems a recent blurriness of these differences, (Van Wart, Cayer, and Cook, 1993). This is because of the need by public organizations to help their employees learn many aspects pertaining to their jobs, such as skills needed to deal with new technologies, training, etc. This made the task look more like that of traditional education. There has been a great deal of training research literature that was published in the second half of the 20 the century. It covered both: the academic and practitioner perspectives. However, the some were susceptible to creditability and acceptability issues. For example, in the seventies of the last century, Campbell (1971) compiled a review of those works. He cast a negative assessment of those researches, as being non-theoretical, non-empirical and poorly written. He concluded that they were of little benefit (ibid). A follow-up study, by Goldstein (1980), however, found that more and more important literature dealing with critical training issues is coming into life. It is ironic that although about 200 billion US Dollars is being spent annually, by US companies, in employee training – and denoting its importance, positive impact on productivity, quality, job satisfaction, good profit level, and favourable customer perception (Harnisch, 2007), there is a study by Noe (1999) which shows that training only registered limited interest among managements, and if any, it came with low support for the training function. To solve this discrepancy, Mager (1996) has attributed it to misconceptions about the expertise of trainers and the value of training. From another vantage point, Garavan, Barnicle & Heraty (1993) offer the lack of political skills as the reason. As for the construction industry, the story is different whereby one would find that training in construction is much researched, though rather centring on the description of different techniques and the practical implementation of training programmes. However, in construction not much research can be found on the issue of training needs analysis (TNA), notwithstanding that by Loosemore *et al.,* (2003), where it is suggested that in the context of construction business employees complain about their training needs not being met by their companies. This is so, despite the fact that construction is believed to be characterized by permanent and rapid change (Hassan, 2004).

The collective agreements in the construction industry encourage technological change as a means of increasing demand for training development for construction workforces. Training programmes are no stranger to the construction industry. Indeed, the construction industry has used training to deliver a wide range of technical and managerial skills to workforces. Training in the construction industry provides companies and their employees with the necessary skills to meet the business needs of the companies. This in turn allows construction companies to compete advantageously based on their capabilities and to outperform other companies in the industry. The requirement for training programmes arose from the potential impact of skills shortages in the construction industry. For example: in the United Kingdom, the training and development problems in the industry have been identified, specifically the lack of skills and knowledge, in order for employees to benefit from new technologies and fulfil management roles ('Rethinking Construction' Report, 1998).

Training can be defined as an organised process concerned with the acquisition of capability or the maintenance of existing capability. Training in industry has a specific purpose: it should provide experience which develops the behaviour of employees in the areas of skills, knowledge and attitude (Hamblin, 1974). Another simple definition of training in traditional training theory is *"...the acquisition of knowledge and skills for presently known tasks"* (Lawrie, 1990, p 44, quoted in Crutchfield, 2000, p 92). Deutsch (1979, p 104) also defines training in the following way: *"Training serves to help increase upward mobility within the organization, to adjust workers to the technological changes affecting the workplace, and often simply to introduce people to the world of work at the entry level"*.

Armstrong (2001, p.543) defined training as: "*The formal and systematic modification of behaviour through learning which occurs as a result of education, instruction, development* *and planned experience*". From an economic viewpoint, it is understandable that training is one technique used to resolve national problems (Akhorshaideh, 2013). Beardwell and Holden (1997) believe training as a tool used for solving particular economic problems such as unemployment and breaching the skills gap. In the same way, Chan and Lim (2003) point out that training can be considered as skill improvement whereby the learning of a new skill or the achievement of new knowledge to improve an individual's abilities adds value to the economy. Based on the earlier definitions, it is clear to the researcher that training is a planned programme created by an organization to enable employee learning of current or future job-related capabilities (Akhorshaideh, 2013). In relation to capabilities, it has been noticed that these contain skills, knowledge, attitudes or behaviour that is critical for effective work performance (Raymond, 1999; Goldstein & Ford, 2002; Cole, 2002). Training is the application of knowledge to provide employees with better understanding of the current system and the rules of organizations (Mufeed & Naila, 2009; Anuradha, 2003). Training is not a reward instrument for an outstanding achievement or a motivation to enhance or reform poor performance. Iqbal & Malik (2011) said companies undertake training in order to bring about a behavioral change in their employees, however, it does not always have the desried result. Therefore, training is an important activity within an organization and is aimed at effecting positive changes in the trainees in terms of their knowledge, skills and attitudes, thus making the level of performance better. In other words, training is a planned and continuous process designed to meet the training needs, present and future, of an individual through increasing knowledge and improving skills, which improve employees' performance and increase productivity at work. There are a large number of published studies describing the role of training in expanding the scope of skills available within the workforce, as well as in improving existing expertise; all with the goal of improving business efficiency and effectiveness. It also enhances the capabilities of a team and improves retention in the process, as staff may feel empowered and invested in, as well as being better equipped to deal with their daily activities (Farrell & Gale 2003).

However, there is little attention focused on construction skills training investment within the construction industry. Previous research in construction has pointed out the various shortcomings of the training provision within the industry (Chan et al., 2001; Soud, 1996). For example, the Construction Industry Board (CIB) (1998) and the Construction Industry Training Board (CITB), both attributed reasons such as the traditional skill boundaries and the ineffectiveness of the professional institutions, to be the causal factors of this deficiency. Whilst these tend to focus on the supply side of training, other researchers (Hoare, 1997;

Winch, 1998) highlighted the reasons for the poor demand for training by construction firms: e.g. the high costs of training, the shift towards self-employment and the inability to attract new blood into the industry. Underlying these reasons, Chan et al., (2001) suggested that training participation is low as employers simply do not recognise its benefits.

Within the current economic expansion, the industry is expected to face a considerable problem, now and in the future; a lack of skilled employees, including managers in the workforce of organizations (Mackenzie *et al*., 2000). Therefore, the issue of training needs to be taken seriously. Training involves direct investment in construction companies and because it is a substantial investment in any organization, companies need to pay specific attention to their employees' current training needs before undertaking any. To achieve this, organizations must decide the best and most effective method of assessing employees' current skills and needs (Sega, 2006). Investment in training has been recognised by many authors as being crucial to addressing the persistent skills problem in this industry (Muya *et al.*, 2007). However, achieving an effective training programme in construction is not easily undertaken, as there are important steps to be considered when companies plan a training programme. The initial approach to training is not easily decided and it involves many sub-tasks (Jamil, 2005). It entails real attention being paid to the accuracy of identifying 'needs' and the best way of fulfilling those 'needs'.

In Arab countries, as in other developing countries, (Al-Ali, 1999; Durra, 1991) the importance of training is still not yet considered a tool to improve a company's performance and develop its staff. This could be attributed to the fact that managers are not aware of the needs of their employees and the importance of training development programmes to their organizations, therefore it is often said that training in most Arab organizations, and particularly in the construction industry, is neglected. This means there will be an on-going demand to increase the skills level of the existing workforce in Arab countries.

2.5.1 Benefits of Training Construction Site Workforces

Mohamed (2006) explained that successful organizations have better prospects of attracting skilled workers, either by providing superior working conditions or by being able to develop their skills and knowledge by providing training programmes. According to McConnell, (2003, p.44) "*The benefits of training are apparent: trainees are provided with the knowledge and skills needed to ensure optimal performance outcomes; a reserve of workforces qualified* *to meet the organization's operational objectives and needs can be developed from inside the organization; and training contributes to optimistic morale, individual development and satisfaction* ." The following sub-sections give an overview of the benefits and issues related to training.

2.5.1.1 Skills Update

Concerns exist over how construction organizations can improve their employee's skills in the future in construction project management and practice, while facing a current skills challenge in the industry (Trejo *et al*., 2003; Edum-Fotwe; McCaffer, 2000; Graaff Ravesteinjn, 2001; Chinowsky, 2002; Holton *et al.*, 2000). The need for training in technical and management skills is felt by all project participants, and by those from various academic backgrounds, all of whom are working for the common goal of project efficiency (Teixeira & Pires, 2006). Training is also needed in the spheres of knowledge and skills, so that the organization's professionals can maintain their positions and the organization can be more competitive (Teixeira *et al*., 2006); this remains a subject of continuous inquiry (Odusami *et al.*, 2007). In many construction industries around the world, investment in training has been identified as the key to addressing the pervasive problem of construction craft skills shortages (Dainty *et al*., 2004; Mackenzie *et al*., 2000; Gann & Senker, 1998; Syben, 1998; Jayawardane & Gunawardena, 1998; Kumaraswamy, 1997).

2.5.1.2 National Development

Many authors also hold that training is a task that must be undertaken if the construction industry is to rise to the challenge of providing strong support for national development.

2.5.1.3 Customer Demands

Most construction firms are now under pressure to meet customer demands for higher quality services; therefore construction companies now take training very seriously (Hussan, 2004).

2.5.1.4 Competitiveness

According to Putt (1998) '*Competitive positions are enhanced by the ability of companies to use their staff to their optimum economic advantag*e'. Thus, training in the construction industry has become increasingly urgent as human capital has become a competitive asset or tool within organizations (Grugulis, 2007). Training by an organization can be an extremely powerful and cost-effective investment, but only if it is implemented to fit the organization's needs and objectives (Dufficy, 2001). Delivery of high quality services is essential in the current scenario to achieve a sustainable competitive advantage and retain customers.

2.5.1.5 Improved Efficiency

It has been shown that training of employees in the construction industry will bring higher productivity, higher profits, improved quality and lower operating costs (Delgado, 2006; Saoud, 1996; Kamarrudin *et. al*., 2009; Acacio, 2009; Morris, 2009).

2.5.1.6 Managers' Improvements in Performance

Training has long been identified and recognised as one of the fundamental and key processes within the construction industry to enable organizations to have managers with the desired qualities (Odusami *et al*., 2007; Ejowhomu *et al*., 2006; Hassan, 2005).

2.5.1.7 Other Benefits

Training has been identified as one of the most effective vehicles for learning and will contribute to quality and improvements in the performance of people in their jobs (Mullins, 2007). It has also been recognised that with training comes higher productivity, higher profits, improved quality, lower operating costs, more reliable estimates, greater problem-solving abilities, more productive teams and better internal and external communication (Castellanos & Martín, 2011). A detailed examination of efficient techniques used to improve the capabilities of construction professionals showed that training is a very important determinant of skills development in construction and that it helps to govern the supply of skills in the construction industry (Muya *et. al*., 2004; Dainty *et al*, 2004; Ben Saoud, 1996). Many construction organizations tend to focus on their labour as part of a survival strategy, retaining and retraining their more skilled employees. Loosemore *et al.* (2003) insist that people are individuals who bring their own perspectives, values and attributes to an organization, and that when managed effectively, human traits can bring considerable benefits to organizations. It has been suggested that the success of a construction organization depends largely upon the quality and morale of its people; therefore, human factors are the most important assets of construction organizations, as long as these are nurtured adequately and their potential is developed efficiently (Loosemore *et al*., 2003; Kleiner, 2001; Mullins, 2007; Tan Hanleng, 2005).

Table 2-2 Summary of the potential benefits of training

Benefits of training	**Related Literature**
Improved skills and knowledge for employees	Bartlett and Kang (2004); Cole (2002)
Improved employee performance	Thomason (1991); Goldstein and Ford (2002); Armstrong (2003)
Improved employees' morale	McConnell (2003)
Good reputation for organization	Jacobs and Washington (2003)
Reduced anxiety or frustration for employees	Chen *et al.* (2004)
Improved work stability	Chen *et al.* (2004)
Increased job satisfaction for employees	McConnell (2003); Rowden and Conine (2005)
Improved ways of satisfying customers' needs	Kauffeld and Willenbrock (2010); Armstrong (2003)
Increased value of employees in the labour market	Goldstein (1993); Johnston and Packer (1997)
Individual career benefits for employees	Bartlett and Kang (2004)
Increased self-efficacy	Pattni and Soutar (2009)
Enhanced productivity, quality, creativity and innovation	Spies (1993); Redman and Wilkinson (2009)
Reduced costs of operations for organizations and increased profitability	Spies (1993); Leader (2003); Redman and Wilkinson (2009); Wu (2002)
Improved competitive advantage for organizations	Lin *et al*. (2010); Pawell and Yalcin (2010)
Improved employees' loyalty and commitment	Armstrong (2003)

Improved organizational performance	Yiu and Saner (2005); Thomason (1991); Armstrong (2003)

2.5.2 Identifying Training Needs

Identifying training needs requires careful scrutiny of an organization's mission objectives, personnel, production, raw materials, costs and other factors (Brown, 2002). A training needs assessment often indicates the need for well-targeted training, (McArdle, 1998). If 'needs' are identified accurately, the likelihood of the training being successful is increased (Jamil, 2006). A study of training needs by Hassan & Stephenson (2005) suggests that, in order for any training to be purposeful and effective, it must reflect the actual needs of participants. Training is associated with the work performance of personnel, and performance 'gaps' imply that there is a shortfall in the knowledge and/or skills required to undertake certain roles or tasks.

As the lack of skilled construction workers is a common problem in most construction firms, there is an urgent need for contractors and owners to address this skills shortage by identifying the training needs of their employees (Marzouk, 2009). The debate continues about the training needs of the workforce, and has been of interest to researchers in the construction field (Teixeira *et al*., 2006; Odusami, 2001; Wahab, 1991; Odusami & Ameh, 2006). In general, the 'identifying the training needs' step is recognized as one of the most important steps in training. This first step in the training process is primarily conducted to determine where training is needed, what needs to be taught, and who needs to be trained. Thus, without this step, there can be no solid diagnosis to determine if the training process was correctly designed (Anderson, 1994; Bowman and Wilson, 2008; Goldstein 1993).

2.6 TNA Theoretical Framework

2.6.1 Definitions of TNA

A considerable number of research studies have been published previously on TNA definitions, contexts and by-names (see table 2-3 below). These studies have provided in-depth definitions of the TNA theoretical framework (Iqbal & Malik 2011; Gupta *et al*., 2007; Altschuld & Lepicki, 2010; Kaufman & Valentine 1999; Cekada, 2010; Kaufman 1994; Armstrong, 1996; Tao *et al*., 2006). For example, there are varied treatments such as: needs; needs assessment; needs analysis; training needs analysis and finally training needs assessment.

Table 2-3 TNA family definitions

Definitions	Authors
1-Needs:	
• **Need is the gap between current and desired (or required) results, or (stated another way) the gap in results between 'what is' and 'what should be'.**	Kaufman (1994)
• **A learning or performance gap between the current condition and the desired condition is called a 'need'.**	Gupta *et al.* (2007, p. 14)
• **In its simplest form, a need is a measured discrepancy between the current state (what is) and the desired one (what should be).**	Kaufman (1994, p. 14)

2- Needs assessment:	
• **Needs assessment is a process for identifying needs and placing them in order of priority on the basis of what it costs to meet the need versus what it costs to ignore it.**	Altschuld & Lepicki (2010
• **A means of determining the training and development systems and programmes needed by the organization, employee groups, or individual employees to make the organization competitive in its industry, improve productivity, build employee morale and job satisfaction, and improve promotion potential and foster career development. Needs assessment identifies gaps in capabilities, abilities, and on-the-job results (performance), and places the identified needs in an order of priority for resolution.**	Kaufman (1994, p. 14)
• **Needs assessment is a process of figuring out how to close a learning or performance gap. It involves determining what the important needs are and how to address them.**	Tracey (2004, p. 457)
• **A needs assessment is a formal process to 'obtain information on the two states (current versus desired), compare them, identify gaps, and arrive at needs-based priorities for organizational actions'.**	Gupta *et al*. (2007, p. 14)
• **Need Assessment is defined as 'an investigation, undertaken to determine the nature of performance problems in order to establish the underlying causes and the way training can address them'.**	(Erasmus *et al*, 2000).
3-Needs analysis **The process of determining the reasons and causes for a need so that appropriate interventions may be identified and later selected.**	
• **Breaking down a need to identify its causes and its relationships with other needs. This is one of the means of identifying current or projected skills or deficits among employees. It may involve the use of assessment centres, individual interviews, psychological tests, and so on.**	Altschuld & Lepicki (2010) Kaufman (1994, p. 14)
4-Training needs assessment	

• **'Training needs assessment involves the study of ways of designing and developing instructional and informational programmes and materials, after the performance analysis has determined that training or informational materials are indeed appropriate'.**	Tracey (2004, p. 457)
• **'A systematic study of a problem or innovation incorporating data and opinions from varied sources, in order to make effective decisions or recommendations about what should happen next'.**	Rossett (2009, p. 31)
• **'A training needs assessment identifies specific problems within an organization by using appropriate methods of gathering information (such as surveys, interviews or observations), determines which of the problems requires a training solution, and then uses the information to design training interventions that solve the original problem'.**	Rossett (1987, p. 3)
• **Training needs assessment is dominated by senior management decision and supervisors' opinions. The skills inventory is the most widely applied formal technique. Organizations tend to pay more attention to customers and work groups when defining training needs. In general, objective and formal methods should be adopted more widely (e.g. training audits).**	Mathews *et al* (2001)
5- Training needs analysis	
• **The first step in the training process. Designed to identify performance gaps that can be remedied by training. It consists of surveillance, investigation, and data analysis.**	Tracey (2004, p. 678)
• **Training needs analysis is the initial step in a cyclical process which contributes to the overall training and educational strategy of staff in an organization or a professional group. The cycle commences with a systematic consultation to identify the learning needs of the population considered, followed by course planning, delivery and evaluation**	Gould *et al* (2004)

Source adopted: Iqbal & Malik (2011)

Based on review of different journals and articles related to the area of training-needs assessment and analysis Chiu *et al.* (1999) offered a broad theoretical framework for training-needs assessment and analysis, focusing on several questions as follows: first, who are the key initiators of training-needs analysis? Second, what are the levels of interest in the studies (i.e. organisation, process, group or individual)? Third, what is the intended outcome of the analysis? Finally, what methods of analysis are used? The researchers found that the literature was dominated by a supply-led approach to training needs-assessment (Chiu *et al.,* 1999), which is largely trainer-driven and authority-oriented, coming from the vested interests of trainers (Akhorshaideh, 2013).

2.6.2 Needs Assessment vs. Needs Analysis

A large and growing body of literature has reported studies on the term, 'needs analysis' and defines it as '*the process of determining the reasons and causes for a need so that appropriate interventions may be identified and later selected*' (Kaufman, 1994, p. 14). This definition confirms the relationship between needs assessment and needs analysis. This is because ignoring the former leads to the question: 'what do I analyse?' Brown (2002) defined needs assessment as: an on-going process of gathering data to determine, which training needs exist, so that training can be developed to help the organization accomplish its objectives. In term of training needs assessment, a study by Arthur *et al.* (2003) showed that training needs assessment is the process of determining the organization's training needs and providing an answer to the question of whether the organization's needs, objectives, and problems can be improved by training.

The definitions, which have been observed above by research of the TNA families have, so far, been discussed and explained in terms of the difference and relationship between training needs assessment and training needs analysis, with reference to results. The main reason behind this wide-ranging description of the TNA families is to prevent any misunderstanding regarding the simultaneous or interchangeable uses of these terms. The processes of removing confusion should include: needs analysis, front-end analysis, training needs assessment, training needs analysis, needs surveys and demand analysis. These terms may contribute to confuse the topic of training needs assessment if there is no clear distinction is made between assessment and analysis. On the other hand, even with respect to processes, needs assessment may be designed to identify and prioritise needs, while a needs analysis should break an identified need into its component parts and determine solution requirements (Watkins et al., 1998). The literature (Watkins *et al*., 1998; Iqbal & Malik, 2011) also argues that the diagnosis of training needs is a process of information gathering and analysis, in which data sets are acquired to understand how an individual's knowledge, skills and attitudes are translated into varying behaviours and achievements. Therefore, they maintain that training needs assessment and training needs analysis should be performed at the same time, or as one process. This interpretation is emphasized by some researchers, who note that this is the reason why theorists and practitioners agree that the training process should begin with a combination of assessment and analysis of training needs (Elbadri, 2001; Bozarth, 2008; Rossett, 2009; Burner, 2010; Truelove, 2006). Further studies have shown needs assessment (or needs analysis) to be the process of determining the organization's training needs and seek to answer the question of whether the organization's needs, objectives and problems can be met, or addressed by training, (Goldstein & Ford 2002; Brown 2002; Harnisch, 2007). A needs assessment is used as a catalyst for identifying training needs and for evaluating the effectiveness of training programmes that currently exist, or have the potential to exist in the future. The term 'needs' is related to another name that is relevant to TNA: the 'gap'. In this context, 'need' is defined as the process of identifying *'the gap between existing results and desired outcomes or results between "what is" and "what should be*"' (Kaufman, 1994, p. 14). The identification of training needs could help to understand the gap between what is happening in an organization and what must happen in terms of employees' behaviour, which is influenced by their knowledge, skills and attitudes (Al-Khayyam, 1998; Azizi *et al.*, 2010; CITB, 2000; Hassan *et al.*, 2004; Marzouk, 2009; Goulding & Alshawi, 2004). In other words, training needs exist when an employee lacks the knowledge or skills to perform an assigned task satisfactorily. So far, the literature has revealed the intricacies of relating and combining the concepts of 'assessment' and 'analysis'. What is more, the simultaneous use of assessment and analysis of training needs helps identify the unique developmental requirements of employees working at different levels in the organization with the objective of ensuring that their training needs are appropriately met (Effah, 1998). In the light of existing definitions of the key terms and discussion of them, it is believed by the researcher that Training Assessment is wide-ranging study consisting of two stages. The first, analytical stage, identifies inconsistencies in performance standards, current performance and current competence, and then ranks these inconsistencies by prioritising them in order of severity. The second, curative phase, discovers the causes of the prioritised inconsistencies, and then decides on using training, non-training, or both types of interventions for their solution (Iqbal & Malik, 2011). Even though there are many labels, all of them do refer to a systematic effort, by which data is gathered to investigate and identify performance problems, in order to come to a decision whether or not they could be potentially solved by training activities (Chiu *et al,* 1999). For the purpose of this study, the term Needs Assessment is preferred because it is considered the more commonly known term and easily understood by training practitioners in all organizations.

2.6.3 The concept of Training Needs Assessment

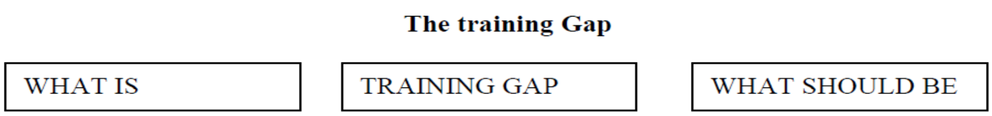
Armstrong (2009, p. 4) reports that '*human resources management (HRM) is a strategic and coherent approach to the management of an organization's most valued assets: the people working there, who individually and collectively contribute to the achievement of its objectives*'. Training should be systematic and organised. If not, it fails to identify the needs of the employees. TNA aims to answer the questions: who must be trained in an organization? What must they be trained in? And when and where will the training take place? Goldstein (1997) and Goldstein & Ford (2002, pp. 22-23) recommend that TNA should consist of three levels of assessment to determine the needs that training can fulfil: the first level is organizational analysis, which focuses on identifying where in the organization training is needed; second level is task analysis (knowledge, skills and abilities – KSA analysis), which aims to identify the content of the training, i.e. what an employee must do in order to perform competently; lastly is individual analysis, which determines how well each employee is carrying out the various tasks that make up their job. Training needs can be defined as: a shortage of skills or abilities, which could be reduced or eliminated by means of training and development (University of London, 2006). A training needs assessment is therefore the process of identifying the skills deficiency and associated training needs. The idea behind training needs assessment is that only when there is a match between training needs and the content of training, beneficial outcomes to organizational performance can be realized (Van Eerdeet *et al.*, 2008). Every training programme begins with an analysis of training needs.

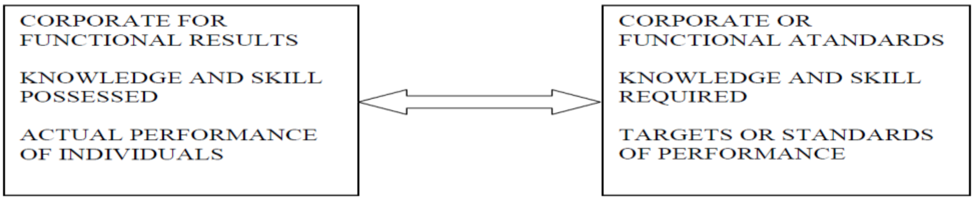
Identifying the training needs of employees is considered to be essential to designing an effective training programme and is contributory to the organization's training strategy (Vijayalakshmi, 2012).

Muya *et al*. (2003) state that appropriate training can only be developed if the training needs assessment is identified carefully. This requires an organization to understand and anticipate the future skills needed by its staff. Enshassi *et al*. (2007) strongly recommend that attendance on training programmes should be mandatory for novice project managers, prior to them being allowed to take charge of construction sites. However, many businesses face the prospect of wasting valuable training budgets because they do not know how to identify their internal needs accurately, and so cannot design the most suitable training and enhancement programmes (Denby, 2010; Chapman, 2000). Other significant barriers to training needs identified from previous studies include a lack of high quality standardised training programmes and a dearth of support materials, resources, expertise and technical assistants (Clover *et al*., 1999; Wang, 2008). Inadequate training needs assessment leads to frequent problems on the construction project site management. Therefore, it is fundamental for construction companies to provide their employees with an appropriate training needs assessment, in order to bring up to date the relevant skills and knowledge for their employees and to meet the challenges of today's dynamic and complex business environment. Training Needs Assessment is a vital part of the training design process, in which endeavours are made to reduce the 'gap' by finding out what needs to be learnt (Hassan & Stephenson, 2005). Without TNA, there can be no solid prognosis to evaluate whether the training process completed was correctly designed (Odusami *et al.*, 2007; Ejowhomu *et al*., 2006; Hassan, 2005). According to one author: *'Inadequate needs assessment can result in inappropriate and ineffectual interventions which could either have no impact or have a deleterious impact on the actual performance problem'* (Wagonhurst, 2002, p 78). Training needs assessment is an ongoing process of gathering data to determine what training needs exist so that training can be developed to help the organization accomplish its objectives (Brown, 2002). Furthermore, the idea behind training needs analysis is that only when there is a match between training needs and the content of training, beneficial outcomes to organizational performance can be realized (Van Eerde, et al., 2008). In order to do this an efficient method of carrying out a TNA must be designed to provide the necessary information for measuring the most desirable skills employees need (Shehu & Akintoye, 2008). Therefore, a TNA is likely to play a major role in the development of workforce skills and especially of managerial skills (Liska *et al*., 2000; Pappas, 2004; CURT, 2007; Marzouk, 2009; PADCO, 2006; UN-Habitat, 2007).

The competitive market in the construction industry has increased the need for managers and engineers involved in the management of construction projects to have superior skills and competencies (Ruiz, 2004; Forde & Mackenzie, 2005). Hence, the training needs of the construction workforce have become an essential issue among construction firms worldwide in order to promote project effectiveness (Teixeira & Pires, 2006; Ruiz, 2004; Forde & Mackenzie, 2005). In Iraq training remains the most crucial issue facing all Iraqi industry these days. Across the country, insufficient emphasis is placed on training staff to meet the new challenges of the technological changes in industry. Regrettably, training is often given a low priority in the Iraqi construction industry, and this has resulted in construction companies taking an '*ad hoc'* approach to the provision of training (UN-Habitat, 2007). On other hand, the construction industry in developed countries has given more attention to training as a strategic factor in its long-term vitality and growth, thus improving the company employees' performance and keeping abreast of any technological changes to update their skills and knowledge (Teixeira & Pires, 2006). It is be difficult to find much academic literature on TNA in developing countries. However, there are a number of case studies, which report how organizations or industries have conducted these assessments (Cekada, 2011). Anderson (2000) emphasized that a needs assessment is '*the starting point in the training process*es'. It is the stage at which an organisation's needs could be identified, thus creating the foundations for an efficient training effort. A training needs assessment can be tailored to suit individual organisations to determine: what kind of training programmes are needed for its employees; who needs to be included and what conditions the training will occur under (Ghufli, 2012; Van Eerde *et al.*, 2008). Finally, TNA has become the concern of every proactive manager, who uses it for developing and implementing various practical solutions for individuals, work groups, and organizations (Gupta *et al*., 2007; Noe, 2001; Patton, 2002).

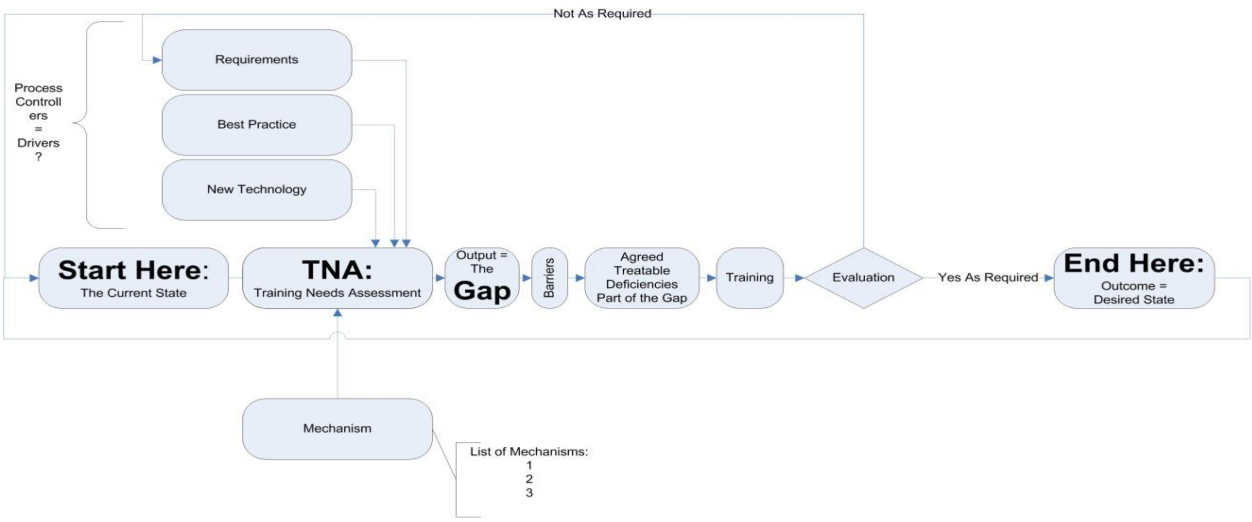
Figure 2-2 Training needs gap





Source: Armstrong (1996)

Figure 2-3 IDEF process representation of TNA



Source adopt by researcher: A simplified diagram showing an IDEF process representation of the cycle of needs achievement and the positioning of TNA in this cycle.

2.6.4 Will it solve Every Problem?

Conducting an effective assessment ensures that training is the appropriate solution to a performance deficiency, keeping in mind that training is not the solution to, for example, problems caused by poor system design, inadequate resources or understaffing (Sorenson, 2002). In some cases, increasing an employee's knowledge and skills may not resolve the deficiency, and hence, implementing training as the solution may waste valuable resources and time. A training need assessment can help to determine current performance, or knowledge levels related to a specific activity, as well as indicate the optimal performance, or knowledge level needed. For example, a 25% increase in slips, trips and falls in the production line area may indicate an emerging problem. A needs assessment collects information about worker competence or about the task itself, in order to help identify the causes of problems (Rossett, 1987 McCoy and Hargie2001).

For training needs assessment to be effective, the person conducting it must understand the problem clearly and consider all solutions, not just training, before determining the best one and presenting their findings to management. 'When properly done, a needs analysis is a wise investment for the organization. It saves time, money and effort by working on the right problems' (McArdle, 1998, p. 4). Costly mistakes can arise when an organization fails to conduct a training needs assessment, or conducts one ineffectively. For example: a company may rely on training to fix a problem when another solution would have been more effective, or it may employ training without examining the required performance skills for the task in question (Cekada, 2011; Sorenson, 2002). A TNA can help to determine current performance, or the knowledge levels related to a specific activity, as well as the optimal performance, or knowledge level needed; it ensures that the right remedy is applied to a problem (Cekada, 2010). The following issues in the next section might indicate training needs (Brown, 2002; McConnell, 2003).

2.6.4.1 Development of employee/management skills to fill a current need

- Trainee or intern training plans
- Reduction in Force (RIF) placements
- New Employees
- New supervisors
- Managerial competency assessments
- Reassignments
- Promotions

2.7.4.2 Employee relations/organizational problems

• Performance problems

• Production problems

• Safety problems

• Inspection deficiencies

2.7.4.3 Meet changing needs

• New technology

• New equipment or programmes

• Modernization of equipment

• Mission changes

• Laws and regulations

2.7.4.4 Career Development

• Employees' requests

• Career enhancement plans.

2.7 Training Needs Assessment in Arab Countries

Previous studies of training-related issues in most Arabic construction industry organizations have not dealt with TNA effectively. Several authors have shown that developing the expertise of the workforce in Arab countries is tremendously important, if these countries want to be competitive globally. The current practice of TNA is of widespread concern; however, in Arab countries it appears to be in need of particular attention. There has been very little research conducted into training needs in these countries. These needs lie mostly at the managerial level of all sectors such as construction, medicine, banking, and production management (Altarawneh, 2009; Abu-Arqoub, 2008). Previous studies reported such as study by Altarawneh, (2009) in Jordanian bank, that most Arab countries have had to recruit temporary foreign managers for posts usually earmarked for nationals. This is until sufficient numbers of nationals are adequately qualified to assume the same level of responsibility. The shortage of managerial skills in Arabic countries is responsible for this situation (Atiyya, 1993; Al-Husan & Brennan, 2009; Ali *et al.*, 2002).The lack of management development programmes is regarded as one of the existing problems in Arab countries. Empirical data from several sources indicates that many Arab employees, who learned their skills from experience on the job, believe that the best way to prepare future Arab managers is from their on-going workload, rather than investing large sums of money in training programmes that do not necessarily meet their needs (Atiyyah, 1993; Al-Madhoun & Analoui, 2003; Altarawneh, 2005; Abu-Doleh, 2004).

Altarawneh (2005) argues, in his research study on Jordanian banks, that training focused only on factors that related to the process of training, such as training design and implementation of the training programme. However, less attention has been paid to the different levels of TNA: organizational analysis; personal analysis and task analysis. One of the facts that emerged from these findings is that the TNA approach is seemingly neglected in developing countries, and yet this is known to be the best method for achieving effective training outcomes for organizations (Abu-Doleh, 2004). Further studies, in other developing countries (Poon & Rozhan, 2000; Rossilah, 2007; Arthur *et al*., 2003); have concluded that insufficient studies on training, especially with respect to TNA, have been conducted. In addition, the same studies have revealed that the TNA technique is mostly conducted abroad. For example, studies of Malaysian companies (Haslinda, 2009) suggested that the main reasons for this are cultural and national differences, between Westerners and southern Asians, regarding TNA practices. Agnaia (1996) reported that the main TNA techniques adopted by Libyan companies are performance appraisal systems, which are often considered the most common and widely used methods in TNA management. Studies reveal that TNA could be described as being highly deficient in most Arab companies (Altarawneh, 2005). Previous research has also shown that there are no specific or systematic practices or procedures for determining training and educational needs due to the lack of reliable information, turbulent political and economic situations and fast-changing social environments (Abdalla & Al-Homoud, 1995; Al- Khayyat, 1998). In other Arab research studies (Altarawneh, 2010; Altarawneh 2009; Al- Khayyat, 1998; Atiyya, 1993; Agnaia, 1996) it has been argued that assessing the needs of employees is ill-defined and generalised in Arab organizations, rather than systematic. This unsystematic training approach arises for two reasons: firstly, training programmes are not based on identified needs, and this leads to difficulties in evaluating them; secondly, economic, political and social factors force some constraints to these programmes. Apparently, Arab organizations rely on different sources, mainly supervisors or trainees themselves (self-assessment), to get the information required to determine training needs, but they pay little regard to: task or job requirements, job description, or manpower planning (Duna 1991; Altarawneh, 2005). In a recent study (Altarawneh, 2010) it was found that, in Arab organizations, communication does not include employees, when they are selected to be trained. TNA is subject to the views, assessments, experiences and, therefore, perceptions of managers and supervisors. As a result, the outcomes of training programmes may be opposite to employees' expectations and fail to meet their needs. Furthermore, Altarawneh (2005), in her major study of training development at a Jordanian bank, argued that assessing training needs using management performance records may not reflect the actual situation. This is because these assessments are subject to family, nepotism, kinship and personal relationships between the supervisors and employees (Abdalla *et al*., 1998). Moreover, TNA in most Arab organizations is considered to be a stand-alone process (Altarawneh, 2009). Altarawneh (2005) also argued that bureaucratic policies and patronage play more important roles. As a result of these influences few employees are selected on the basis of greatest need. Several research studies (Al-Ali, 1999; Attiyah, 1993; Abdalla & Al-Homoud, 1995; Agnaia, 1996) have identified problems that affect implementing TNA in Arabic countries and these problems or barriers include:

- Lack of money
- Lack of expertise
- Lack of job descriptions
- Unsystematic approaches to training
- Lack of employees' interest in any development programmes
- Lack of top management support
- Wasting time and money

When detailed attention is given to TNA in Arab organizations it will help to determine the gap between what is happening and what is supposed to happen, in order to maximize organizational performance. TNA is crucially important and should be conducted based on a systematic needs analysis to include: organizational needs analysis, job needs analysis and employees' and managers' needs analyses, so as to design a successful and comprehensive TNA programme.

2.8. Different TNA Models

There are many models on how to conduct TNA found in the literature. In general, training needs assessment is comprised of two phases: the first is the diagnostic phase, which is designed to identify inconsistencies in performance and current competence levels; the second phase maps these performance gaps and competencies by prioritising them according to business requirements (Iqbal & Malik 2011; Altschuld & Lepicki, 2010). Two models of training needs assessment will be considered: '*the organization-task-person analysis framework'* (referred to as the McGehee and Thayer's three-level `O-T-P' model in this research) and Mager, and Pipe's '*Performance Analysis Model*'. According to the Organization-Task-Person (O-T-P) model, first presented by McGhee and Thayer in 1961, there are three levels of needs assessment considered to be the foundations of the framework for needs assessment in the academic literature. This model is more popular among academicians, and many models developed by them are based on this foundation. The Performance Analysis Model (PAM) is popular among practitioners, and gaps between expected and current performance are considered as needs for training (Holton *et al*., 2000). Moreover, these two theoretical models of TNA have been the main sources for the training literature for over three decades. Within the O-T-P model in particular, decisions are determined as a result of integrating macro through to micro analyses, arising from an investigation of training needs to meet organizational needs, task or job needs, through to the particular needs of the individual or person. By contrast, the performance analysis model focuses on identifying the areas of discrepancy between desired and actual performance and subsequently analysing the causes of such discrepancies. Also, compared to the performance analysis approach, the O-T-P approach tends to be more strategically useful organizational goals; needs for the future are also taken into consideration (Ali,2012 ; Taylor *et al*, 1998).

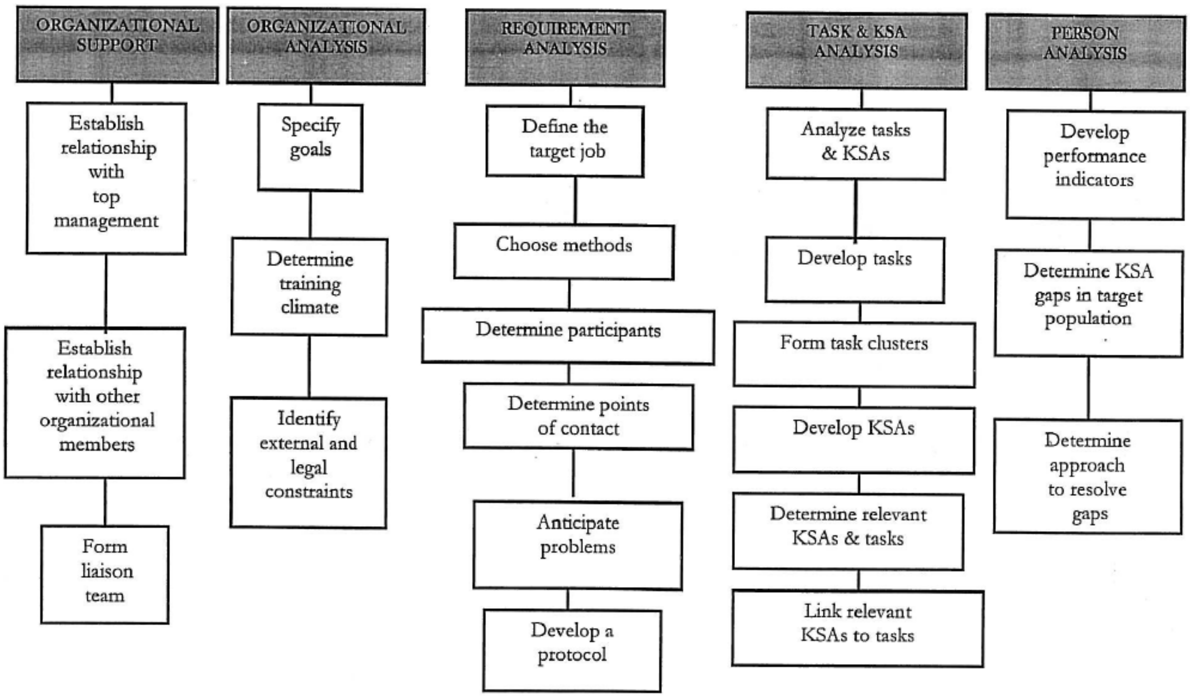
2.8.1 Goldstein and Ford's Model of the Needs Assessment Process

Goldstein and Ford's model consists of five levels of analysis, namely: Organizational Support, Organizational Analysis, Requirement Analysis, Task and SKAs Analysis, and

Person Analysis (Goldstein and Ford, 2002). There are three levels in this model which are can be found in other studies, these are: the organizational level, the task level and the person level; organizational support and requirement analysis are peculiar to Goldstein and Ford model. Goldstein and Ford's model is different in that it emphasises the importance of preparing the ground work in order for the TNA to be successfully conducted. This is reflected in the first level of the model where the needs analyst must gain the support of the organization. This entails developing a rapport with top management to clear the path for the TNA process; a lack of support from top management can be one the main barriers to successful TNA. The second level, organizational analysis, can also be found in other models and involves an understanding of the strategic direction of the organization so that the training needs of the employees can be harmonized with those of the company. To this end the needs analyst must take into account all the elements of the organization: its goals, its resources, its willingness to allow employee's time for training, and the internal and external constraints that might affect the organization's ability to implement an effective training programme. Due to the difficulty and complexity of conducting task / SKA analysis and person analysis, Goldstein and Ford stress the critical importance of clearing the path before implementing these subsequent stages. This is accomplished by requirement analysis which consists of a detailed series of steps the analyst should take in preparation for the next two analytical levels, i.e. define the target job and understand how it fits into the framework of the organization, choose the best method to collect data for these levels, decide on the members of the workforce who have the data and how best to enlist their cooperation, recruit suitable members of the company to facilitate the collection of data, anticipate potential difficulties, and develop some universal guide lines for the data collection. Goldstein and Ford's outline of how the two final levels of analysis are to be carried out are not dissimilar to other models of TNA (Jamil, 2006; Kirkpatrick and Kirkpatrick 2006).

This study plans to use McGehee and Thayer's three-level (Organization-Task-Person) model of needs assessment, because it is regarded as the most widely used and developed due to being based on the three-level frame used by many organization from different industries (Holton, E. *et al*. 2000). Clarke (2003) also stated that the O-T-P model integrated macro through to micro analyses, arising from an investigation of training needs to meet organizational needs, task or job needs, through to the particular needs of the individual or person (Ali, 2012).Thus, in order to design effective and successful training programmes, which satisfy both organizational and human assets, the objectives of TNA programmes must be based on three levels: organisational, operational and individual analysis, together with the use of appropriate techniques to collect data at all three levels (see table 2-3 below) (Agnaia, 1996; Jamil, 2006).Goldstein and Ford (2002) reported that organisational support is one of the main requirements for the success of the training needs assessment process Goldstein and Ford (2002) also argued that in addition to organisational support, requirement analysis is this step that analyst focuses on the requirements of the job. However, according to previous studies in TNA, for example: a study by Sherazi et al. (2011) on training needs assessment practices in corporate sectors of Pakistan; and studies by Altarawneh (2005) and Abu-Doleh (2004) reviewing TNA in the Jordanian banking sector, show that TNA is conducted before training, but attention was only paid to a single level. Therefore, the researcher concluded that training decisions in these organisations were not made based on systematic TNA and paid limited attention to employees' personal developmental training. This implies that organizations still concentrate on correcting employees' daily performance and focus less on organizations' future needs. Results from literature reviews on TNA studies for the past 25 years by Chiu, *et al* (1999) can be used to support this finding. It was found that TNA conducted at organizational level dominated the literature; studies to analyse personal needs were much less common (Amos-Wilson, 1996; Agnaia, 1996; Elbadri, 2001; Jimal, 2006). Chiu, *et al* (1999) expressed concern regarding organizations who's lack of interest in developing their employees as, in the long run, it might result in poor performance, less competence and depreciation of their staff's motivation levels. On the other hand, a few studies, conducted mostly in developed countries, showed that TNA could perform systematically and multi-dimensionally (on different levels), leading us to conclude that companies are continuously interested in the bottom-line issues of developing employees in the long run. There may be several factors underlying attitude inimical to TNA: firstly, organizations might simply be unaware of the importance and benefits of TNA; secondly, they might not have the capital to invest in employee training (Chang et al., 2012; Teixeira & Pires, 2006; Healy et al., 2002; Jamil, 2006). The TNA model are shown in Figure 2-4, and explained in detail in the following section. It revealed to the researcher that there was little proof that academics, consultants and managers would work together in training-needs assessment research. Concerning the levels of assessment, as it appears to the researcher the biggest proportion of studies focused on analysing organisational needs, followed by the group level, and then the process level (24%). Investigations at the task and individual level were relatively few. Therefore, it is worthwhile to cover this gap by having a comprehensive concerned at all levels in this study and for the future search in organisations.

Figure 2-4: Goldstein and Ford's Model of TNA



Adopted from Goldstein and Ford (2002)

2.8.1.1 Organizational Analysis

Organizations have an effect on the ways in which training programme designers try to put training into practice. This level of assessment focuses not only on determining where training should be distributed in the organization, but also on exploring organizational aspects, which may affect the training programmes . For example, the desideratum to align training objectives with the organization's strategy has perpetually been underlined (Brown and Read, 1984; Harnisch, 2007). According to Brown (2002, p 572) *'organizational analysis observes where training is needed in the organization and under what circumstances the training will be conducted. It identifies the knowledge, skills, and abilities that employees will need for the future, as the organization and their jobs evolve or chang*e'. Noe *et al.,* (1997) put forwarded that at the present time companies face four competitive challenges: 1) The quality challenge which is concerned with meeting customer needs, 2) The global challenge which involves international expansion; 3) The high performance work system challenge which involves integrating incipient technologies and work design, and determinately 4) The gregarious challenge which is concerned with the management of a different labour force. Each of these challenges present different training needs. An exhaustive organizational analysis will scrutinize the company's overall strategy and objectives to ascertain that the training activities will fortify this thrust. Noe (2005, p 77) writes: '*organizational analysis also involves the consideration of strategic company directions; of whether managers, peers and employees support the training activity; of what training resources (budget, time, expertise for training) are available*'. Harnisch (2007) suggests that if this level of analysis were taken up, then not only would there be a need to determine where training should be provided in the organization, but also what the organizational features are that might affect the training programmes. Organizational analysis highlights the departments that require training and the associated training conditions. This is carried out, taking into consideration, the future changes that might take place, such as in skills needs, the labour pool, and/or laws and legislation (Brown, 2002; Harnisch, 2007). Empirical studies published by many authors suggest that, at the present time, companies face four competitive challenges: the quality challenge, which is concerned with meeting customer needs; the global challenge, which involves international expansion; the high performance work system challenge, which involves integrating new technologies and work designs; and finally the social challenge, which is concerned with the management of a diverse workforce. These challenges require different training (Harnisch, 2007; Noe 2005; Noe *et al*., 1997).

2.8.1.2 Operational Analysis

Task analysis is, '*a method of determining the knowledge, skills, tools, conditions and requirements necessary to perform a job*' (Harnisch, 2007, p 14). Task-level analysis aims to identify the gaps between tasks in terms of performance achievement indicators. For example, if employees lacked the capability to carry out a task and a performance gap existed, then an organization would need to provide training to ensure that performance met the requirements (McGehee & Thayer 1961). A task analysis separates a job into its different task mechanisms and draws conclusions about the Knowledge, Skills and Abilities (KSA) and forms of job behaviour needed to perform them successfully. Task analysis deals with job requirements and compares employees' skills to identify: the tasks that have to be performed; the conditions of performance; how often and when tasks are to be performed; the quantity and quality of required performance; the required skills and knowledge and where and how these skills are best acquired (Brown, 2002). Goldstein and Ford (2002) divided task analysis into four main phases:

1- Determination of standards of performance.
2- Identification of tasks that constitute a job.
3- Description of how each task is to be performed.
4- Identification of KSA needed for each task.

Once this is completed, the researcher can analyse those personnel who perform the job in question and examine whether they possess the required KSA (person analysis) (Harnisch 2007; Brown, 2002).

2.8.1.3 Individual Analysis

Individual analysis targets individual employees in terms of their knowledge and how well they perform their jobs (Brown, 2002). According to Jamil (2006, p 20) '*Individual-level analysis is aimed at the position that a person serves. When an employee lacks the necessary skills for achieving individual performance requirements, the organization will provide related training to ensure that the individual performance meets the requirem*ents'. The emphasis in this level is on assessing how well the employee performs the job by using the knowledge, skills and attitudes required by it. In this step a set of criteria for measuring job performance is required. Another important aspect of person analysis is to determine which necessary knowledge, skills and attitude have already been acquired by the prospective trainees; as a result this will save time and money (Goldstein and Ford ,2002; Akhorshaideh,2013 ;Odusami *et al*., 2007; Harnisch, 2007).

It is clear now that successful training begins with a needs assessment to determine which employee should be trained and what he or she should be trained to do According to Erasmus *et al* (2003:455), a needs assessment entails time, money and expertise to conducted successful TNA. Regrettably, it come into view of the researcher in this study many organisations mainly in developing countries carrying out training without making this essential initial investment. Frequently, there is no systematic plan to predict to determine whether perceived needs can be met and problems be solved by training. If training has taken place without a careful assessment of requirements, it is likely to be ineffective, reducing the motivation of employees to attend future training programmes. Furthermore, none a single organisation conducted comprehensive level of analysis, and mostly individual analysis is neglected. Most organisations when face problems in their performance, training is one of the options to solve the problems. When the problems result from the employees' lack of capability, the organisation started to adopt training to increase the employees' capability to perform the work or tasks. However, an intervention is required before training adopted; because it is crucial to collect and analyze the situations. For example; is there any deficiency problem found in organisation before undertake training. This is the meaning of training needs assessment (Judith, 2002).

Table 2-4 TNA model three levels

Level	Objectives
1- **Organizational**	• Meet administrative, regulatory, technical, or other requirements affecting the organization. • Gather data necessary to prepare the annual training plan
2- **Occupational**	• Assess workforce skills for short- and long term staff to plan for a competent, skilled, well-balanced, and representative workforce. • Identify career paths for key occupations within the department and plan for development of employees to proceed along these paths. • Identify employees who will be impacted by downsizing and

	organizational restructuring. • Identify those employees who will require retraining. • Design and develop competency-based training courses. • Identify under-utilized employees and their needs. • Identify employees with high potential and provide them with developmental opportunities
3- **Individual**	• Determine individual skill requirements needed by employees. • Determine skill requirements that are necessary for individual development within career paths. • Determine skill requirements to accomplish the mission and goals of the department. • Obtain information needed for the development of training courses or programmes. • Identify goals for individual career development.

Source Adopted: by Sharma: Available at www.cgg.gov.in/TNA%20Methodology%20-%20A%20Toolkit.pdf

2.9 Gathering Data to Identify Needs

Data gathering is a key step in TNA. Smith, Delahaye and Gates (1986, p. 66) '*felt that a training needs assessment is only as good as the data which is used in the analysis'*. In the research, the terms 'methods' and 'techniques' used to identify training needs have been used both synonymously and as having distinct meanings. For example: Chiu, *et al*, (1999) and Goldstein & Ford (2002) used both terms to refer to the same things. This study makes a distinction between the 'methods' and 'techniques' used to identify training needs. Jamil (2006, p 30) defines 'methods' as *'the instruments that analysts can use to collect data for TNA purposes and they include methods such as questionnaires, interviews, group discussion methods, observation, etc.*'; and 'techniques' 'as *the procedures by which TNA can be conducted and the analysts may need to adopt some of the TNA methods to carry out the* *techniques'*. Examples of common techniques are job analysis, task analysis, and Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, and performance appraisals.

Overall, Jamil (2006) divided TNA methods into two broad categories based on the types of data they produce - quantitative data and qualitative data. He suggested that quantitative data refers to the importance of something. In the case of a quantitative method lacking particular KSA, the methods used to provide the missing data will be questionnaires and numerical/quantifiable tests. Jamil (2006) suggests that these methods are only suitable when data needs to be collected from a large percentage of the population. Qualitative methods, however, highlight the primary definition of something. Methods used include focus groups, on-site observations and reviews of the literature or records. Jamil (2006) suggested that these methods are best used when analysts need to explore the data they discovered quantitatively in detail. Needs analysts should have good communication skills, empathetic listening skills and good interpersonal skills. They should also have the ability to observe objectively and subjectively, so that qualitative data gathering methods can be used effectively (Chiu, *et al.*, 1999; Goldstein & Ford, 2002). As shown below, there are advantages and disadvantages to each of these methods, so it is advisable to use more than one method in the TNA process in order to produce the most reliable results (Wagonhurst, 2002; Jamil, 2006). In **Table** 2-5 the different methods that can be used are outlined; some of these methods can be applied to construction workforces.

Table 2-5 TNA methods

Method	**Explanation**
1-Delphi Method	Delphi is a group discussion method which allows communication between participants who are distanced from each other. Basically, the method is based on an understanding of the concept of group dynamics. Firstly, it is recognised that each participant does not have the same information. This generates the need to make decisions as a group in order to produce better decisions. Secondly, some members may not have been encouraged to offer their opinions and may feel uncomfortable in doing so, especially to those members of the group in higher level positions. The Delphi method was created in order to address these needs. The use of Delphi in TNA is recommended as one of the tools to analyse training

	needs.
2-Questionnaires	Questionnaires are the most widely used method of data gathering for needs assessment. They are the most economical as they can be quickly distributed among a large group, are relatively simple to administer and are straightforward and easy to analyse.
3-On-Site Observations	On-site observations methods are used to distinguish between effective and ineffective behaviour and organizational structures and processes. They are also a common way of conducting job analyses. Observations must be carried out by subject-matter experts (SMEs) if the data they yield is to be useful. One criterion for selecting SMEs is that they need to be experienced and knowledgeable about the job they observe (Jamil, 2006). This method is only useful if the job is observable and measurable and can be analysed in terms of which KSA are required to perform the job effectively.
4-Advisory Committee	This is another form of group decision creating technique which involves employees at different levels in organizations who have information regarding an issue. The advantages of this method are that it builds management involvement and sponsorship in the TNA process, it is inexpensive to carry out and it involves key decision makers, thus making the task of implementing the results easier (McCoy, 1993). However, this method is time consuming and it is sometimes difficult to organize meetings involving all the members, and there is a tendency towards ‘groupthink’ syndrome in the group decision making.
5-Document Reviews	As stated earlier, there are many readily available documents which can provide data for TNA exercises. Examples of these include those that give information on employees’ productivity, absence rate, organizational charts etc. The advantages of the available data are that they can provide objective evidence regarding performance problems and analysts do not have to spend too many resources in gathering them. However, existing data must be treated with caution. They tend to be incomplete and do not show the background and causes of the problems, are usually quite old, and skilled data analysts are needed in order to examine and make sense of the data in the context of TNA.
6-Focus Groups	This method involves small groups discussing issues or problems to produce new ideas, solutions and proposals. The use of focus groups has become popular in the marketing profession because it is useful for gathering information on customer behaviour (McCullough, 2011). Focus groups are also useful for assessing training needs when used in conjunction with other data-gathering methods. This is regarded as the most effective method for teaching problem solving and decision-

	making skills. As such, it is probably more useful for management than staff level training.
7-Performance Appraisal Forms	This is the most common method to determine training needs based on performance appraisal and is also the most widely used method in determining training needs (Brown, 2002; and Agnaia, 1996). Usually, at the end of an appraisal form, a space is provided for supervisors to state the strengths and weaknesses of the appraised employee and recommend areas that the employee needs to improve on and develop. This method is also considered to be one of the most complex and controversial techniques in the human resource field (Roberts, 2002).
8-Assessment Centres	After employees' selection and promotion, assessment centres are widely used to determine employees' training needs (Beck, 1983). Assessment centres involve the use of various combinations of measures to identify training needs. Examples of measures that can be used are psychometric inventories, interviews, observed performance on simulated tasks, written tests, peer ratings, role plays, in-basket exercises, business games and presentations (Osborne, 1996; Beck, 1983). Due to the variety of exercises and multiplicity of assessors the results of assessment centres tend to produce specific, reliable and valid information regarding employees' strengths and weaknesses. This allows the most suitable training needs for the employees to be determined. However, assessment centres may not be practical for all organizations as they can be quite expensive. They may only be suitable for large and well established organizations that can afford such complicated and comprehensive training systems. Thus, this method is normally used only for senior-level employees.

Source: Adopted from Jimal, (2006)

Based on this study it appears to the researcher, that there is no specific method that can be identified as being the best. In fact, it is not a question of 'either/or' but of which method is appropriate for a particular purpose at a specific time and in a certain circumstance. As illustrated in appendix 1 (Table 1), each method has special characteristics that can affect the type and the quality of information obtained. For example, an interview can reflect the interviewer's biases, while a questionnaire can have sampling biases if only a few participants return the survey. It is, therefore, preferable to use more than one method to help validate the data, as different types of information are obtained with the different methods. For example, you can use questionnaires to gather facts and carry out follow-up interviews to delve more deeply into the reasons for people answering the questions as they did. It is also important to include people from a cross section of the target employees. If people with varying experience levels are not sampled, the sample will not be valid and training will only be effective for a certain section of the total population targeted (Brown,2002).

2.10 Criteria for the TNA Data Collection Method:

A small number of criteria should be considered carefully by organizations when choosing data collection methods (Brown 2002). Jamil (2006) (cited in Ulschak, 1993) reviewed the criteria normally considered by organizations in choosing data gathering methods for TNA. They were resources: time, money and people; availability in the organization; health of the organization; persons to be involved; desired outcomes; extent to which needs are already known; decision-makers' preferences; time lag between collection/action; degree of reliability and validity needed; confidentiality; and the training need analysts' favoured method. Brown (2002) stated that analysts need to consider the following when choosing which technique to use*: 'the nature of the problem, budget, perception towards TNA in the organization, staff availability, time-frame, etc.'* According to Jamil (2006) the importance of each criterion depends on the organisation itself and the purpose of a particular TNA.

2.11 Techniques Used in Conducting TNA

As mentioned previously, techniques refer to the procedures by which the activity can be conducted. Discussions of these techniques are categorized into three levels. Each technique is designed to analyse needs at the organizational level, operational level and individual level. These techniques are described as follows:

2.11 .1 Organizational Level

These techniques are developed to measure the overall effectiveness of business performance and to help companies plan their strategies and missions. These may possibly include a need to enhance human resource capabilities (Jamil & Som, 2007). The techniques used in this context are:

2.11.1.1 Organizational Scanning

This technique, as the name suggests, is concerned with organizational activities. The aim of this technique is to measure the overall effectiveness, which is a measure of the practical benefits intended of the business performance of some activity, and help firms plan for their future; i.e. to plan strategies and missions, which might entail some changes to human resources (Jamil & Som, 2007).

Organizational scanning – sometimes called environmental scanning – comes in the form of the process of the management collecting information about what goes on in an organization. They collect information on issues concerning events and trends, as well as how the outside world interacts with the organization as a whole, for the sole benefit of helping the management to lay down strategies (Choo & Auster, 2001). The same point is highlighted by Jamil (2006), he states that it is '*a management process of acquiring and using information about events, trends, and relationships in an organization's external environment to assist the management in planning the organization's future course of action'*. Other researchers, such as Chiu, *et al*. (1999), have also confirmed that this technique is used to analyse training needs at the organizational level. The issue of external influences that could produce a list of possible training (or non-training) needs was mentioned by others (Choo & Auster, 2001; Jamil, 2006), adding to the body of research on this matter.

2.11.1.2 Balanced Scorecard

One important technique (Marr & Schiuma, 2003) developed by Kaplan and Norton in 1996, is that of the Balanced Scorecard, used for measuring business performance. Training (or non-training) needs can be determined using the Balanced Scorecard method. It is based on four points of view from which an organization can be assessed. These perspectives are financial, customer-related, internal activities (or processes) and learning and growth. If these are balanced, then, according to Kaplan and Norton, this would enable an organization to remain competitive by combining measures of past financial performance with measures for future financial performance. Moreover, the Balanced Scorecard could clarify and harmonize the relevant players on issues concerning strategy and communicating such strategies throughout an organization, for the purposes of their implementation. One of the other pros of this technique is its ability to identify discrepancies between personal and departmental goals and those of the organization's strategy. Other pros include: indicating how to link strategic objectives to long-term targets and annual budgets; identifying and aligning strategic initiatives; performing periodic and systematic strategic reviews; obtaining feedback, so that by learning from experience the strategy could be improved.

2.11.1.3 SWOT Analysis

SWOT analysis, an abbreviation for Strengths, Weaknesses, Opportunities and Threats (Halla, 2007), is a well-known technique within management. When this technique is used to decide upon strategies, it is used in the initial stages of the decision-making process and as a precursor to strategic, and various kinds of applications. In this context, and keeping the competitive environment in mind, it could provide useful information on matching organizational resources and capabilities to the environment it operates in (Craig, 1994).

The term 'strength' in SWOT, is an umbrella term for many items, such as brand names, patents, reputation, etc. Weaknesses might include obstacles to the progress of an organization in its mission to achieve its set objectives, thus it might include the lack of access to resources, hindering costs, etc. Opportunities are what make it possible for organizations to meet customers' needs. Anything that might obstruct what an organization aims for is a threat, for example: an unfavourable change in the external environment. Therefore, SWOT analysis helps firms in the strategy setting process and with other issues required to address their needs (Jamil & Som, 2007; Chiu *et al*., 1999).

2.11.1.4 PEST Analysis

PEST stands for Political influence, Environmental influence, Social influence and Technological influence. There are some, however, who include Legal and Environmental influences, thus the acronym PESTLE - or PESTEL. Whichever term is used and its content, it is a technique for analysing the macro-environmental factors that affect organizations (Mullins, 1999). It can identify the opportunities and threats mentioned in SWOT scanning (Jamil, 2006; Jamil & Som, 2007). Political influence is in the form of rules, regulations and legal issues by which an organization is bound. Economic factors are those that affect the ability of customers to purchase, cost of capital etc. Whatever affects the demographic and cultural aspects of a firm's external macro-environment is Social influence. Technological factors affect barriers, efficiency of production levels, outsourcing decisions, etc.

2.11.2 Task Level

There are a few techniques used to determine the KSA related to a particular job or task (Ghufli, 2009).

2.11.2.1 Job Analysis

Job Analysis involves collecting information on a particular job at two levels: what would, or does, the job involve; and what knowledge, skills and abilities (KSA) are needed by the employee to carry out the job (Harris, 1997). As such, this type of analysis is not restricted to training purposes, but may also be used to help with other human-resource related matters, e.g. safety, staff-development etc. (Jamil,2006 cited in Harris, 1997).

2.11.2.2 Competency Analysis

Noe (2005) suggests that competency analysis enables organizations to discover KSA and the values and personal characteristics necessary for both the current and future organizational demands. Dubois and Rothwell (2004) believe that competencies refer to the knowledge, skills, attitudes, mind-sets, and thought patterns that an individual employee must possess in order to perform a job successfully (Jamil, 2006; Jamil & Som, 2007). The employee who possesses this group of competencies should be able to perform well in any job within the same category (e.g. managerial). Competency analysis is probably the most popular in use today as its focus is not limited to current performance discrepancies but extends to an examination of future needs (Jamil & Som, 2007). Competency analysis enables organizations to not only discover the KSA, but also the values and personal characteristics necessary for both current and future organizational demands (Noe, 2005).

2.11.2.3 Skills Inventory

A skills inventory involves a comparison of the skills and knowledge required to do a particular job with the skills actually possessed by the current jobholder (Jamil, 2006). The differences are then used as the basis for planning any training interventions for employees. Undoubtedly, this technique is still based on the traditional view of TNA. For example, training is delivered when there is a gap between existing and expected performance. Documents such as job descriptions are needed to make comparisons (Jamil & Som, 2007).

2.11.3 The Personal Level

Person analysis focuses on identifying who should be trained and which training is needed by individuals. The techniques below are used for this level of analysis:

2.11.3.1 Performance Review/Appraisal

According to many research studies, this is the most common technique used in organizations (Lovell, 1997; Jamil, 2006). Individuals' performances can be reviewed by their supervisors (upward appraisal), subordinates (downward appraisal), themselves (self-appraisal), or colleagues (peer appraisal). Generally, at the end of any performance appraisal, supervisors can identify the strengths and weaknesses of the appraised employee and recommend areas that the employee needs to improve and develop (Jamil, 2006).

2.11.3.2 Repertory Grid Analysis

Authors such as Peters (1994), Jamil & Som (2007), and Osborne (1996) have pointed out that this technique is used to identify training needs on an individual level. Jamil (2006) claims that companies use this technique, to identify and compare, good performers and poor performers. According to Peters (1994), the advantages of this technique are that is creates a new understanding of a performance issue which helps companies to differentiate between good and poor performance. Ultimately, managers get a better overall understanding of the organization (Jamil, 2006).

2.11.3.3 Versatility Chart / Analysis

Jamil & Som (2007) state that checklists approach can be used to evaluate a person's skills or the lack of them. A resultant Versatility Chart helps to identify an individual's training needs and to create a training plan to fulfil those needs. This technique involves filling in a simple matrix listing employees' names and tasks. In addition, interview or observation data can be gathered on employees to identify their KSA; a self-assessment method can also be used (Jamil, 2005; Osborne 1996).

2.11.3.4 Diary Analysis

Diary analysis is a techniques used to conduct TNA that involves employees recording their behaviour, thoughts, feelings, hopes and difficulties (Osborne, 1996). Jamil (2006) suggests that Diary analysis could be categorized into structured or unstructured forms. For example: the structured method is generally used to analyse how employees use their time during a specific task. To interpret the records they need to be discussed with the employees' supervisors and team members, and assessed against some standard of performance. Based on the result of this method, training needs can be identified. The unstructured method is used when employees' detailed thoughts/feelings are needed to describe a situation/task/job by comparing their current performance with an expected performance; this is normally done with the help of competent TN analysts. The benchmark would provide the training needs for the employees (Jamil & Som, 2007).

Based on above discussion, in theory TNA needs to be conducted systematically on three different levels. For example: needs at organizational level should first be analysed, followed by operational (job) and individual analyses. Certain methods and techniques can be used to identify needs at each level, such as the Balanced Scorecard (organizational level), task analysis (operational level) and performance review (individual level). Many organizations, particularly in developing countries (Agnaia, 1996; Duraa, 1991) fail to recognise the importance of the TNA step in their training interventions (Agnaia, 1996; Elbadri, 2001). This could be attributed to the fact that these organizations may invest on training without proper analysis of how such training could help their strategic needs. Furthermore, in these organizations training was often not strategically conducted: the training needs were not properly assessed to determine how such needs contributed to the overall strategic objectives of the organizations (Jimal, 2006). Additionally, most employees in charge of training development in these organizations did not possess the proper or relevant qualifications to be put in charge of training and developing the organization's workforce. It is often said that individuals considered being competent in the field of training by virtue of their qualification background need to continuously update their knowledge to avoid being guided by outmoded TNA theories (Jimal, 2006). What is more, existing literature on TNA shows that most studies were done overseas. Due to various cultural and national differences, findings from developed countries (for examples see studies on training needs analysis by Healy et al., 2002; Teixeira et al., 2006 and also the above discussion on TNA methods and techniques) may not reflect similar descriptions regarding TNA practiced in Arab countries, specifically among organizations in Iraqi construction companies.

2.12 The Importance of TNA Outcome

Debate continues about the importance of TNA to training programmes. The importance assigned to TNA is based on the fact that training programmes can fail due to a lack of attention paid to the assessment/analysis phase. Training can be expensive; therefore, it is critical that it is tailored to meet the specialized needs of the organization and of the individual trainees (Brown, 2002). TNA can provide important data on the training needs of an organization. Salas and Cannon-Bowers (2001) state that needs assessment is the most important step in deciding who should be trained and what training should be made available In addition to justifying the costs of training and providing important data for the organization, taking part in a needs assessment can actually improve employees' satisfaction with the training (McCullough, 2011; Devi & Mallika Rao, 2012). Numerous studies have confirmed that needs assessment is key to the success of training in the construction industry (Hassan *et al.*, 2005; Odusami *et al.*, 2007; Gunawardena & Jayawardane, 2002). Another study (Denby, 2010) used a case study to show that there is a likely advantage to using TNA. He found that an organization reported a 56 per cent increase in productivity following the implementation of improvements recommended by the author's consultancy company after conducting a TNA. However, some organizations are still not carrying out TNA adequately and effectively. This is due to the fact that the TNA process is usually viewed as being too costly and time consuming. A large longitudinal study (Daniels 2003) could explain why training fails to produce returns. It was mostly due to the organizations' failure to link training efforts with their goals and strategies. Also, and most importantly, the study found that organizations invariably do a poor job of assessing training needs, or fail to carry out this assessment phase at all (Nankervis *et al*., 2002; Sorrel, 1999; Garavan 1997; Reed & Vakola, 2006). Many training programmes, particularly in developing countries, are based on personal wants rather than on identified needs. Indeed, needs assessments in Arab companies are based on '*wants rather than true needs*' (Agnaia, 1996; Atiyyah, 1993; Al-Madhoun & Analoui, 2003; Altarawneh, 2010; Abu-Doleh, 2004). Modern organizations should prioritise TNA, because without such systematic assessment, companies cannot make meaningful strategic decisions in order to achieve organizational effectiveness. The importance of TNA to organizations is explained in detail below.

2.12.1 Organizational Goal Achievement

Goal setting processes and TNA are not independent from each other, and their inter-dependency makes the training and organizational environments richer (Leat & Lovell, 1997). This is due to the fact that TNA, as a systematic process, involves identifying and prioritising training-related issues and their development, as well as organizational goals (Iqbal, 2010; Leat & Lovell, 1997; Morley, 2000; Brown, 2002; Patton & Pratt, 2002). If TNA is properly carried out, then effective human resource development interventions will contribute towards the attainment of organizational goals; it is like a road map for reaching those goals (Iqbal, 2010). This notion has already been confirmed (Desimone *et al*., 2002; Tao *et al*., 2006; Bowman & Wilson, 2008) and TNA '*can be performed if goal setting is considered as its one of the most important parts'* (Mathews *et al*., 2001). The importance of carrying out a TNA in a proper manner must not be under-estimated, for if inadequate TNA practices were carried out under new economic and social realities, this would make traditional practises risky (Abdalla & Al-Homoud, 1995). TNA can affect other aspects, such as: the process of trainer selection; the implementation of certain methods for training purposes; curricula design; and the assessment, or evaluation of training programmes (Agnaia 1996). With respect to TNA itself, its purpose should be to determine existing or potential training needs (McClelland 1994a). Chunn and Thacker (1993) put a condition on a successful training programme, as being one where TNA was based on the goals of the management and the organization's mission. A priority set by McClelland (1994a) for the achievement of TNA, was the carrying out of a preliminary study on probable training issues and/or categories. As with many other management activities, there is a need to follow-up. Iqbal, (2010) (cited in Ashton & Easterby-Smith, 1979) emphasises that the follow-up process is imperative to the achievement of the objectives of the training and development programme. TNA should be based on the goals of management and the mission of the organization if the conduct of a successful training programme is sought. McClelland (1994a) emphasises that one way to address the goals of TNA is by carrying out preliminary research into probable training categories or issues. Along with an organization's goals, training and/or course objectives are also a common basis of TNA (Moore and Dutton, 1978; Gould et al., 2004; Cekada, 2010). Based on this discussion, we formulate:

Hypothesis 1*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training and non-training needs* *that should be used for setting training goals and organizational goals respectively. However, these goals should also provide basis for the future TNA.*

2.12.2 Employee Development

A quote from Karen Fenton, head of human resources at UCI Cinemas, illustrates that the challenges faced by the training profession are '*to become core to the business and anticipate training and development needs, spotting, nurturing and building talent for the future.*' (Training Magazine, 2005, p. 30) These challenges could be addressed by carrying out TNA, as they help those responsible for training to make decisions with respect to employee development (DiLauro, 1979; Ashton & Easterby-Smith, 1979).

Employee development could benefit from TNA when it is exercised for the personal development of employees (Virmani, 2000), thus directing the focus onto how well employees carry out their activities (Leat & Lovell, 1997) and therefore, pin-pointing gaps that need training interventions to address performance variances and promote employee development. On the other hand, TNA could be beneficial by motivating employees to be honest and open about themselves with respect to their work for the organization (Uhlmann, 1973). Having just pointed out the importance of the employees in TNA, it is not surprising that they can be thought of as potential stakeholders of the TNA (Gould *et al*., 2004), especially when it comes to the processes of: recruiting new employees, be it supervisors, or other-wise; staff reduction in force (RiF); reassignments; doing assessments to check-up on the competency of managers; establishing schemes for promotions (Brown, 2002); downsizing; when new employees are enabled to be, ready and willing to perform in a newly prepared environment, in accordance with the standards set (or updated ones) by the organization (Desimone *et al*., 2002).Training needs assessment helps top managers to make decisions regarding employee development (Easterby-Smith, 1979). Therefore, we offer the following hypothesis:

Hypothesis 2*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in providing information on training and non-training needs that should be used for employees' professional and personal development respectively.*

2.12.3 Managing Change

Iqbal (2010) notes that changes in the work environment might carry with them a need for training, thus TNA could lead to individual and organizational change. TNA can help in facilitating the introduction of new systems and/or technologies (Collis, 2001). The same can be said for: new products, new marketing environments (Katsanis, 2006); new equipment and/or programmes, when jobs executed are revisited, and when rules, laws, and/or regulations are newly introduced (Brown, 2002); when jobs are upgraded and new responsibilities are likely to be given to employees (Collis, 2002). It is the dynamism of the world that is giving rise to the need for needs assessment (Putt, 1998; Odusami *et al.*, 2007). It could also be thought of as being a preparation for introducing new work processes in an efficient manner (Chiu *et al*., 1999).

This is evident in the advice given to managers in the sales field (Managing Training & Development, 2002): when faced with different sales productivity demands, note the company's sales training needs and devise effective programmes. The same procedure has also been suggested for a similar production and sales problems (Desimone *et al.*, 2002). All of these potential changes in roles entail TNA of those who are asked to take up new responsibilities. As result, training professionals maintain that TNA is useful when jobs are upgraded and new responsibilities are likely to be assumed by the employees (Iqbal, 2010).The topics covered in this section lead to the suggestion that there are challenges faced by the construction industry, forcing it to change its classical approaches to design, construction, refurbishment and/or maintenance (Fairclough, 2002). The literature also emphasises that lessons learnt from changes in system or subsystem (Iqbal 2010; Cekada, 2010) and organizational culture should be used as data sources for TNA. Therefore, our third hypothesis is:

Hypothesis 3: *There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training and non-training needs that should be used for managing change in the organization.*

2.12.4 Employees' Career development

The definition or tacit meaning of 'career', according to Rees *et al* (2005), implies a road-map, from which there is a sense of there being both direction and purpose involved in the meaning. 'Career' is commonly understood as a chronological process of work-related experiences that a person goes through in their life-time. From this viewpoint, it can be seen, and duly noted by (Rees *et al*., 2005), that TNA has a role to play and/or something to offer with respect to career development, as recognised in the field of organizational theory and practise. In the literature, it is rightly recognized that TNA offers guidelines for employees' career development (Schneier *et al*., 1988). That TNA has some relationship with career development is also emphasised by, Brown (2002), in particular when new recruitment and/or re-organization of staff occurs; or the intervention of new technology is taken on board; or even when an expansion of business is ventured (Agnaia, 1996). More literature referring to the relationship between career development and TNA, the latter being seen as a path to the career needs of employees, could be cited here (Iqbal 2010).

The above strengthens the argument that a clear assessment of training needs empowers an organization to work towards its goals in a suitable time frame, despite limited resources. The implications of TNA for future career development, job security and the career prospects of employees are emphasized in the literature, as just mentioned, and are regarded as substantial (Clarke, 2003). Hence, we propose that

Hypothesis 4*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training needs that should be used for employees' career development.*

2.12.5 Knowledge, Skills, and Abilities (KSA)

It is well established that the construction industry is based on knowledge and skills. According to Pathirage *et al*, (2005), ignorance of the role of TNA in developing skills and knowledge could contribute to weak performance.

TNA have become the driving force in critical competitive advantage situations and are important concepts in the construction industry (Green *et al.*, 2004; Pathirage *et al*., 2005). This is because construction organizations face challenges requiring knowledge and/or skills, to save a project from failure and to solve or manage any problems that occur (Chileshe, 2010). The theme of knowledge, skills, and abilities keeps cropping-up in the TNA literature (Kirkpatrick, 1977; Moore & Dutton, 1978; Cooke, 1979; Ford & Noe, 1987; Dyer, 1994; Cheng & Dawson, 1998; Kellie, 1998; Brown, 2002; Grau-Gumbau *et al*., 2002; Tao *et al*., 2006; Bowman & Wilson, 2008; Cekada, 2010).

It is not hard to see that any improvements in knowledge, skills, and abilities, would be beneficial for firms, as well as for the development of their employees' careers. TNA has an obvious role in facilitating any decision relating to knowledge, skills, and abilities (Schneier *et al*., 1988), as it pin-points the requirements for future phases of developments in employees' behaviour. This behaviour development stems from the deficiency that a worker recognizes when attempting to tackle certain tasks in an assigned job (Hassan & Stephenson, 2005). Research by Khorshidi *et al.* (2012) even suggests that TNA might be used to test the knowledge and skill levels of employees.

In summary, needs assessment could exist when an employee experiences knowledge, skills, and abilities related deficiencies while performing an assigned task satisfactorily, thus becoming a tool to inform the areas in which training is lacking (Iqbal, 2010; Brown, 2002; Grau-Gumbau *et al*., 2002; Bowman & Wilson, 2008; Cekada, 2010). Based on this, our fifth hypothesis is:

Hypothesis 5*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding TNA in identifying training needs that should be used for improving the trainees' level of knowledge and skills.*

2.12.6 Motivation to learn

To get a good level of knowledge, there must be a learning process, as well as the need for motivation to drive this learning process: this is an important issue within the construction industry (Tabassi & Abu Bakar, 2009). This issue of motivation has become a common one among modern organizations (Sandwith, 1993). The concept of trainability reveals that, among other factors, i.e. ability and the perception of the working environment, learning motivation is a crucial factor that facilitates the attainment of an optimum level of learning (Desimone *et al*., 2002). Training professionals of these organizations should, therefore, be able to respond to knowledge and skills training needs quickly accurately, and cost-effectively (Sandwith, 1993). This issue of motivation brings to the fore a direct relationship with TNA, as well as TNA-based training (Orpen 1999; Sorenson 2002). Thus, training should always be planned according to the needs of trainees and the organization; otherwise, the outcome will be bad training; this is worse than no training because it contributes to low morale of the employees (Chunn & Thacker, 1993).The key to motivating employees is to find a suitable means to satisfy their needs, (Colquitt *et al*., 2000). Iqbal (2001) noted a similar point, in that by conducting basic TNA, employees can select the best way to satisfy their needs. This benefits them in solving issues that would otherwise arise after training if they went about the training without giving due care to such means (Schneier *et al*., 1988). It must also be noted that individuals do not have the same requirements in order to perform their jobs satisfactorily; such discrepancies must be catered for, otherwise outcomes will be affected: possibly being worse than if no training had taken place. Such failures carry the risk of lowering the morale of employees. To conclude the discussion of this sub-topic, motivating employees to learn empowers them to respond to knowledge and skills training needs quickly, accurately, and cost effectively (Desimone *et al*., 2002). Therefore, our sixth proposition is:

Hypothesis 6*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training needs which help manage and increase the level of trainees' motivation to learn*.

2.12.7 Cost-reduction

There is an irony in the perception by some senior management, that by avoiding TNA they do not run the risk of high costs (Morano, 1973), while in reality the opposite has been shown; such avoidance could lead to costly mistakes (Cekada, 2010). Some even think that: it is a total waste of the budget that could be assigned otherwise to the training budget (Cekada, 2010; Denby, 2010); or that it is a total waste of valuable resources (Tao *et al*., 2006). There is evidence, however, in some literature which shows that TNA represents a rational approach for the purposes of identifying and addressing training needs in a cost-effective manner and in an evidence-based manner, and that it reduces the training costs, as well as helping to determine training costs, initially (Iqbal, 2010). TNA could also be time-saving, as well as leading to the benefits of good value training (Hassan & Stephenson 2005; Snyder, 2004). It also helps to reduce the effort used in setting up training, and avoids wasteful duplication (Iqbal, 2010). In one study (Iqbal 2001) showed that by allowing TNA to be conducted in an organization, employees could make their own decisions about the best way to satisfy their needs. This in fact could help employees solve many problems without being trained, problems which were otherwise planned to be solved through the conduct of training needs assessment. The point of savings is shown, in that organizations, which use effective assessment techniques can reduce, or even avoid altogether, any waste of training resources: namely effort, time and/or money. Hence the hypothesis:

Hypothesis 7*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project leader engineers, architects and site managers, regarding the importance of TNA in identifying training needs and therefore, by administering training only for the identified needs making it cost effective.*

2.12.8 Training Effectiveness Improvement

Realizing the importance of TNA, especially for conducting a successful training programme is a crucial step, because it determines the nature and scope of a training programme as a first step and then lets the trainer and the trainee make efforts directed towards providing the surety of success for the training programme (Sorenson, 2002). TNA is the most important stage in the training process, because when this stage is performed successfully the remaining stages of a training programme will follow accordingly (Carlisle *et.al*., 2011; Elbadri, 2001; Ferdous, & Razzak, 2012). Taylor (2009) indicated that TNA might serve as a key factor in the success of a training programme. It also serves as a valuable part of the development and growth of a business. Training effectiveness is obviously influenced by the success of the TNA. This is due to the significant role that needs assessment might play in identifying individuals who must be trained; designing training programmes that relate to the needs of both individuals and organizations; outlining the time required; and determining the objectives and skills required, which lead to improving the effectiveness of the training (Agnaia,1996). Furthermore, Iqbal and Khan (2011) emphasize that needs assessment is a powerful organizational and performance improvement tool that helps identify what is working for an organization and what is not. According to them, organizations have been experiencing a paradigm shift in training as an outcome of TNA. Researchers have indicated that TNA is an important business strategy which prepares the organization's human resources for unavoidable changes, and provides opportunities to improve technology, systems, structures and the nature of the work itself (Shah & Gopal, 2012; Denby 2010; Anderson 1994). Hence, hypothesis 8:

Hypothesis 8*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the achievement of training effectiveness through proper TNA.*

2.13 The Situation of the Construction Industry in Iraq

Plentiful natural and human resources allowed Iraq to accomplish the status of a middle-income country in the 1970s. The country developed good infrastructure and the education and health care systems were widely regarded as the best in the Middle East. Nevertheless, successive wars, international sanctions and a repressive, state-dominated economic system have harmed the economic growth and development of this country. Despite the country's rich resources, Iraq's human development indicators are now among the lowest in the region (UN-Habitat, 2006) .After 2003, the growth of the oil sector and infrastructure development gave a boost to the Iraqi economy. Hand-in-hand with this growth, the importance of the construction industry to the national economy became noticeable as a vital tool for economic growth (UN-Habitat, 2007; UN-Habitat, 2006).

The Iraqi construction industry in recent years has had a key role to play in its developing industrialisation (UN-Habitat, 2006).However, many problems have arisen during this construction project's implementation and the lack of skills and knowledge is one of them. Apparently, the majority of the construction industry in Iraq is largely low-tech, unskilled and labour intensive, despite accounting for eight per cent of total Gross Domestic Product (GDP) and employing nearly ten per cent of the Iraq workforce (Jahanger, 2013). This will have a significant impact on the future environment. Inadequate training programmes and a lack of management skills make it difficult for Iraqi companies to cope with the complexity of tendering procedures when competing with international companies (UN-Habitat, 2007; UN-Habitat, 2006).

The construction industry in Iraq has grown dramatically, so there is a requirement for some academic rigour to accompany these changes to suit the current needs of the industry. The Iraqi educational institutions that are responsible for preparing graduate students need a development plan to effectively prepare the knowledgeable, competent construction managers of tomorrow who must be capable of managing the ever-increasing complexity of the modern construction industry (Jahanger, 2013; UN-Habitat, 2007; DfEE, 2000). Since the 1990s training needs in particular areas, such as management skills have been a frequent problem for the Iraqi construction industry (UN Habitat, 2007; DfEE, 2000). The current situation requires new approaches and strategic plans in order to ease the critical lack of skills in the Iraqi construction industry (CURT, 2006). Enabling improvements in the quality of construction projects in Iraq requires a focus on equipping employees with more effective skills. Hence, a training needs assessment is considered to be an essential issue to address the skills gap in Iraq; this is the main objective of the present study (Arshad, 1997).

Clearly, there is now an urgent need for training in Iraq's construction industry to identify the skills and knowledge areas required for specific jobs in order for the construction workforce to keep up with new developments in the construction industry **(**UN-Habitat, 2006). Training is probably the most critical issue facing the construction industry in Iraq today. Across the country, there is insufficient emphasis on training graduates to meet new challenges and technological changes in the industry. It has been suggested that the construction industry in Iraq is a very important agent for economic growth and a sector that can generate employment for both skilled and unskilled workers, increase national productivity and generate economic activity in other related sectors (Jahanger, 2013; USAID, 2006; UN-Habitat, 2007).

The on-going skills crisis in the construction industry, particularly at management level, has resulted in an urgent need for more training in construction management and this is consequently an important issue in the construction industry. The effects of progressive changes and of a competitive market on Iraq's construction industry, since 2003, have increased the need for superior skills within it. However, the industry often faces many challenges, such as the shortage of skilled workers often leading to higher costs, time overruns and quality shortfalls. There is now an urgent need for training in Iraqi housing sector (USAID, 2006; UN-Habitat, 2007).

2.14 Summary

This critical literature review chapter was made up of two sections: the section has discussed the concept of the background of skills and knowledge needed by the workforce in the construction industry. The definitions covered revealed the different types of skills and knowledge that are needed. Indicators of skills and knowledge needs were also highlighted in the Iraqi construction industry, and the skills and knowledge shortage problem in the Iraqi construction industry was reviewed. The second section in this chapter dealt with the definitions of training needs assessment, analysis, and the levels of training needs assessment and methods, and the model of TNA determining the training needs of construction workforces. This section refers to the set of interrelated concepts, definitions, and propositions of TNA framework that presents a systematic view of phenomena by specifying relations among variables. This section examined the reality of training needs assessment, and recognised that although there has been a growing acknowledgment of the need for training for skills and knowledge in many construction companies, debate still exists as to the extent and quality of training needs required. Training is seen as a key tool in the implementation of human resource management practices, especially companies involving cultural change and the necessity of introducing new working practices. Another point which was raised in this section is the there is a lack of recognition of adopting all three levels of training needs assessment in organisations. So in order to proceed with training within any company all levels must be considered and a mutual benefit be derived. This chapter has discussed TNA concept, methods and techniques that can be used to analyze training needs at organisational, operational and individual levels as appeared in the literature section two. The extent to which these, methods and techniques are useful in developing model and are applied by companies in Iraqi construction industry will be elaborated in the next chapter see section 3.4.3 pages 106,107,108 and 109. This section will gives a road map of the process of the development model for Iraqi constructions engineers. The following chapter discusses the research methodology that will make this possible. It outlines the research philosophy, design and data collection strategies to be employed in obtaining the data required to measure TNA practice in the Iraq construction industry.

Chapter 3: Research Methodology

3.1 Introduction

In this chapter the research methodology used in this study is described. The different sections provide in-depth descriptions of each methodological process. In order to avoid criticism or doubt regarding the research, there is a need for a full understanding of the underlying epistemological and methodological concepts reflected in the herein (Pollack, 2007; Smyth & Morris, 2007; Steele, 2000). The research methodology involves the systemic rules and procedures upon which this research project is based and against which the data collected has been interpreted and the findings evaluated. The success and validity of any research is critically dependent on the appropriate selection of philosophical, epistemological and ontological concepts informing the approach, strategy and methods. This enables appropriate data collection, analysis and interpretation of the findings for the benefit of practitioners and researchers. Subsequently, discussions of the various philosophical assumptions and paradigms of the research are presented. This leads to the philosophical position of the research and justifications. Discussions on the research design, strategies and methods adopted are also presented towards the end of the chapter. Consequently, the research is carried out, firstly, by conducting a pilot test survey of the likely objectives with several construction professionals. Getting feedback on these objectives, a title was developed linked with the objectives. Literature reviews have been carried out on previously determined objectives and information on those objectives was obtained from books, conference proceedings, the internet and leading construction management and engineering journals. The literature review provided an opportunity to identify an appropriate theoretical model for the study. The sources used are listed in the reference section at the end of this thesis. A questionnaire was designed to obtain the data required to test the postulated hypotheses of this study. The questionnaires were sent to targeted respondents by means of a web survey questionnaire to identify the TNA and the actual skills and knowledge needed for selected construction companies in Iraq. The choice of research methodology and the reasons for its selection are also provided and mapped out against the research objectives and associated tasks along with research output.

3.2 Philosophy Underpinning the Research

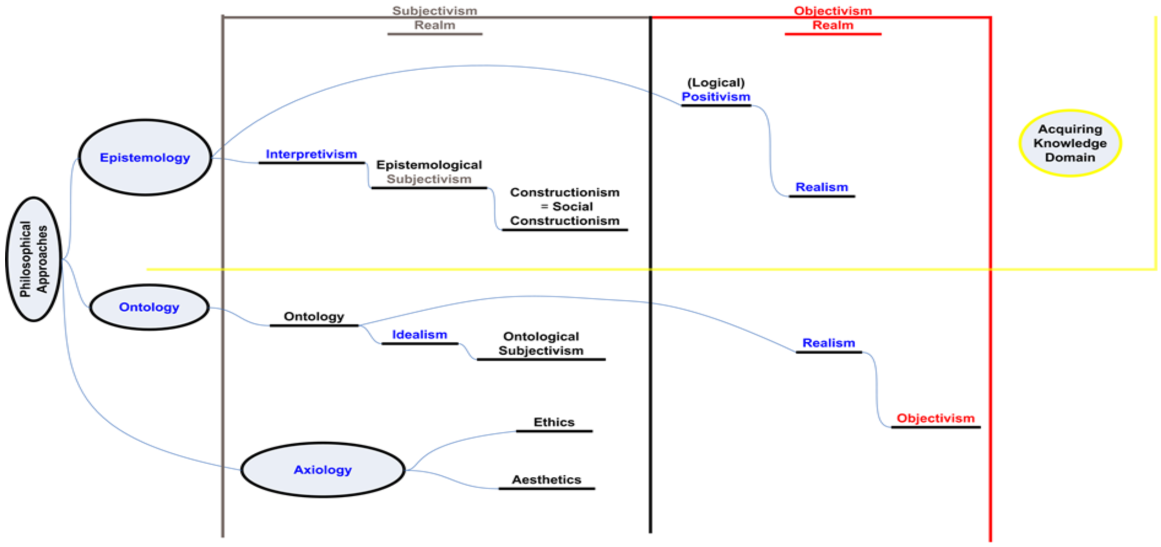
Research philosophy, according to Pathirage *et al.* (2008), deals with the entirety of the epistemological, ontological and axiological issues and undertakings which influence research exercises (Ajayi, 2012). The same point was made by Easterby-Smith et al. (2004:p, 31): '*research philosophy refers to epistemological, ontological and axiological assumptions and undertakings that guide an inquiry in a research study, implicitly or explicitly*'.

Research methodology does not only refer to the methods adopted in a particular research endeavour, but it also covers the rationale and philosophical assumptions that support the study. The rationale and philosophical background in turn influences the actual research methods used to investigate problems and to collect, analyse and interpret data. In other words, research methods cannot be viewed in isolation from the epistemological and ontological position adopted by a researcher (Dainty, 2008: 3). Hence, the term, 'research philosophy' '*refers to the development and nature of knowledge*' (Collins, 2010: 36).

Epistemology is concerned principally with theories of knowledge (Knight and Turnbull, 2008) and/or conceptions of reality (Dainty, 2008: 3). The term is derived from the ancient Greek words of episteme, which means knowledge, and logos, which means account. Knowledge, according to some philosophers refers to 'justified true belief'.

Ontology refers to the nature of knowledge and assumptions about reality. It expounds the claims and assumptions that are put forward regarding the nature of reality. A further sub-classification emerged in which Sexton (2004) explained, in his research approaches continuum model, that ontology itself could fall under the spheres of realism or idealism. As the name suggests, realists view reality as is, i.e. as a pre-determined nature and structure, contradicting the idealists' stance. Idealists assume that observers' standpoints matter, '*what counts for the truth can vary from place to place and from time to time*' (Sexton, 2010; Liyarange *et al*., 2005; Johnson & Duberly, 2000; Bryman & Bell, 2008; Sounders, & Thornhill, 2012; Pathirage *et al*, 2005). Therefore, it seems that ontology allows the researcher to place the research in the category of either realism or idealism (Tobi, & Amaratunga, 2010). In this context, ontology is concerned with epistemology and paradigms (a lens through which the world is viewed) (Collins, 2010: 38) and so, relates directly to methodology, and thence, to data collection and analyses that are justifiable from theoretical and pragmatic considerations (Fellows, 2010: 11). Axiology deals with whether reality is 'value free' or 'value driven'. This separates research into that which uses a value-free approach: where any phenomenon is objectively studied without any pre-judged values; whilst value-laden research is driven by a subjective mentality (an opposite of positivism, phenomena observed by people are their conceptions, and not that of the objects under investigation) (Bryman, 2012; Easterby-Smith *et al*, 2004; Ahadzie, 2007; Belbase, 2007; Sexton, 2004, Creswell, 2003; Easterby-Smith *et al*., 2002). The inter-connections between the various parts of the philosophical issues are shown below figure 3-1

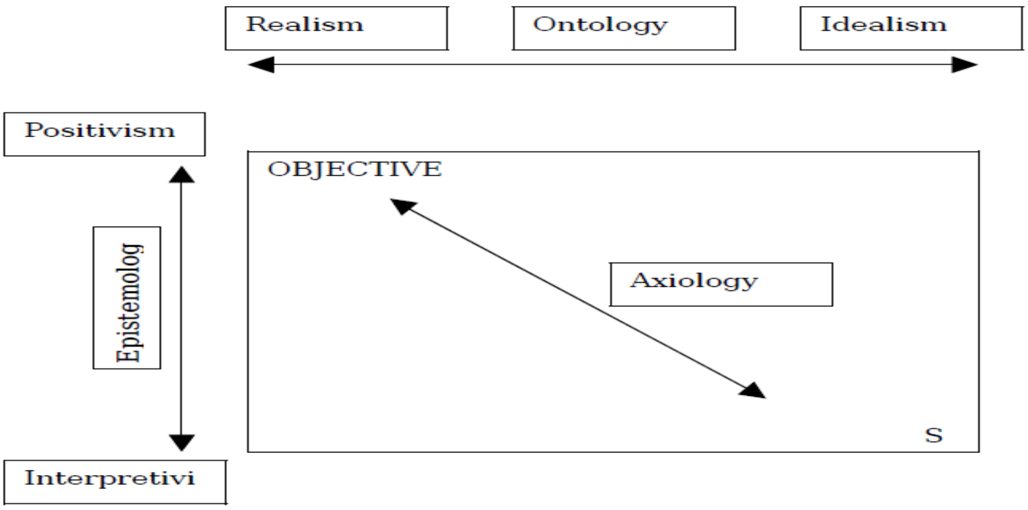
Figure 3-1 The inter-connections between the various parts of the philosophy



Developed by researcher

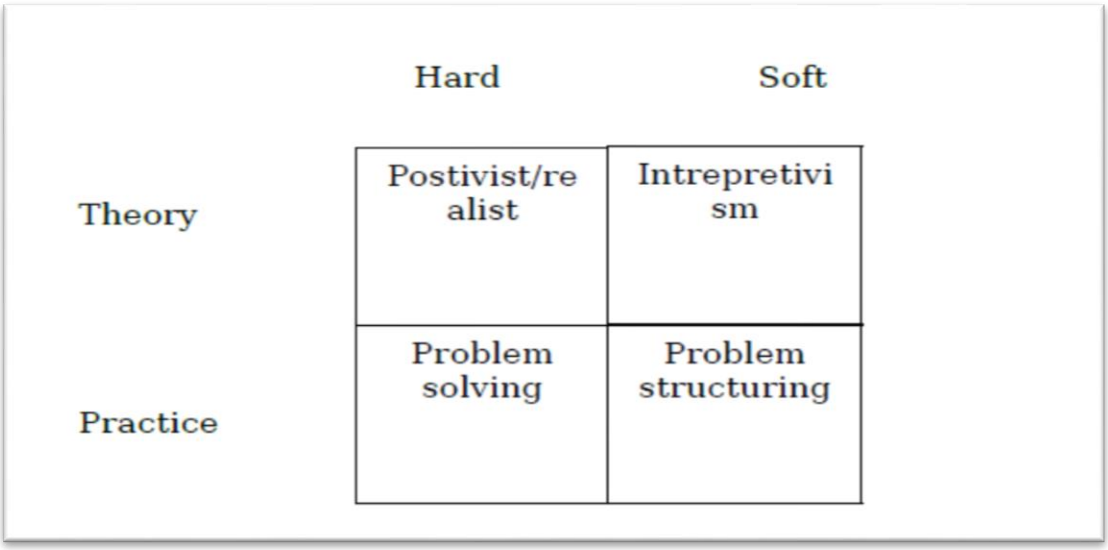
Above all, while positivism may require a relatively large sample size to draw statistical conclusions; with regard to interpretivism the concentration is normally on small samples to help develop theoretical abstraction **(**Easterby-Smith *et al*, 2004; Ahadzie, 2007). Briefly, epistemology refers to what should be regarded as acceptable knowledge in a discipline, while ontology deals with the existent aspect of the knowledge. Epistemology is the study of the theory of knowledge, including the nature, scope and limitations of it; ontology is the philosophical study of the nature of being or existence (Collins, 2010).

Figure 3-2: The relative positioning of the various philosophical issues



There are two paradigms that get mentioned when one talks about the practice of project management; these are 'soft' and 'hard' paradigms, (Pollack, 2007; Smyth & Morris 2007). The softness and hardness seem to refer to the way problems are approached in life. The 'hard' term seems to arise from the fact that it deals with life as it is and attempts to go about research with pre-set ideas, i.e. it is not that flexible in comparison with the 'soft' type. This views life as being subject to the subjects' views or opinions, i.e. having flexibility of opinions, hence the softness term (Ahadzie, 2007; Pollack, 2007) . The realm of positivistic attributes, and/or deductive, reduction or quantitative techniques, are associated the 'hard' types of paradigm, while alternative 'soft' types are subjective and commonly deal with qualitative issues. This short descriptive outline shows that project management research practice, that bases its approach on the 'hard' side, taking into account predetermined goals and interests of the solution put forward to solve the problem in question, tends to: deal with evidence-based, or expertise-based delivery of findings, and approaches issues with efficiency and control, as requirements of the solution (Pollack, 2007). On the other hand, the 'soft' paradigm engages with problems in a participatory manner that has the attributes and benefits of learning and facilitated explorations of these problems, hence the notion of social processes or structures that comes with it. Figure 3-3 shows how the hard and soft approaches are outlined theoretically and their practical differences, in the context of project management practice.

Figure 3-3: The hard and soft paradigm in theory and practice



Source: *Pollack (2007)*

3.3 Justifications for the Selections Made in this Research study and the Philosophy

3.3.1. Research justification for the study

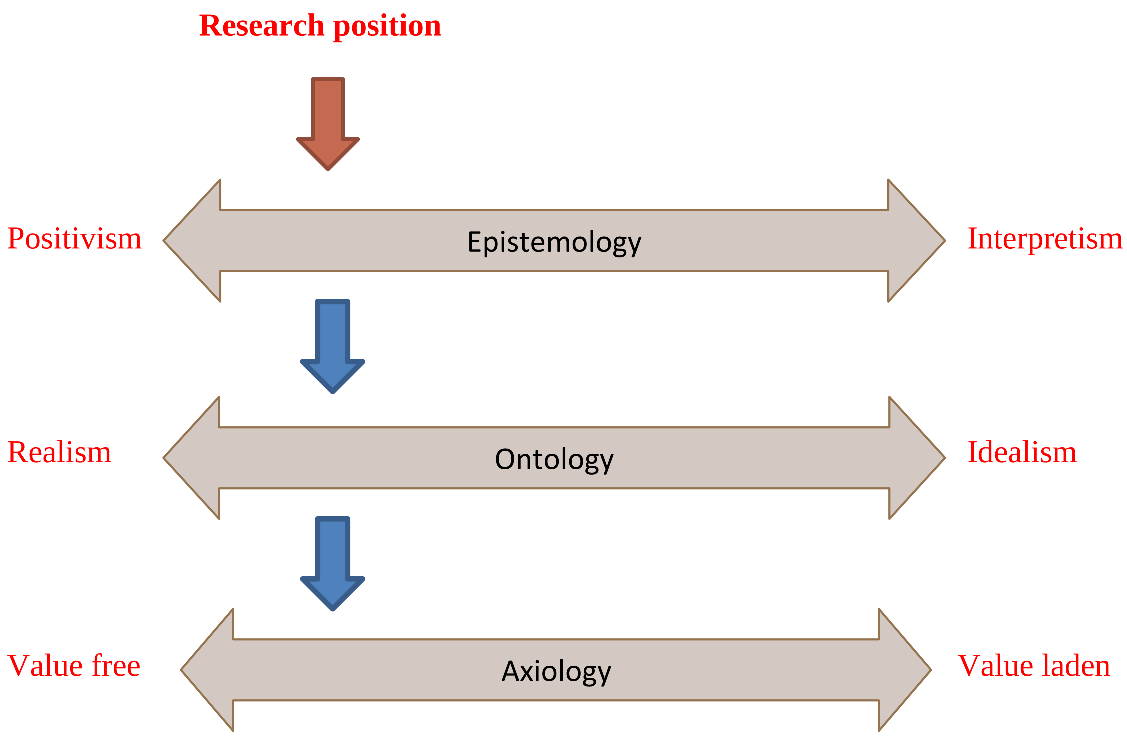
The development of skills and knowledge plays an imperative role in the qualitative improvement of the Iraqi construction industry. The contemporary Iraqi construction engineering workforce must gain a variety of managerial and technical skills to perform new and much more complex roles in construction. The acquisition of these skills and knowledge can be more effectively accomplished after receiving proper training needs assessment. Therefore, it is important to assess the engineering workforce of the Iraqi construction industry so that, based on empirical evidence, a training needs model can be designed for their professional development. In this study it is hypothesised that a construction company that adopts the three levels of TNA would be conducting a more effective assessment of training outcomes than if relying solely on purely analytical techniques. Based on this, this study was carried out to understand: the role of existing training needs, the analytical processes of Iraqi construction firms, the factors that affect the process of identifying these needs and the impact these have on organizational performance. It is hypothesised that it is most likely that across Iraq there is insufficient emphasis given to training the workforce to meet new challenges and technological changes in the construction industry.

This study adopts descriptive research and a non-experimental quantitative approach. According to White (2004, p. 62), '*descriptive research is a non-experimental quantitative method, with the implication of it being a way to describe a current situation as accurately as possible*.' It was decided to use a descriptive research study and also to use a cross-sectional study method and this study is considered relatively inexpensive and takes up little time to conduct. A cross-sectional, survey based approach, is taken in the primary data collection phase of the study. This belongs to the relativist or positivist position at that point in time. Descriptive research is an in-depth description of a specific individual or group; in this study all levels of management in the Iraq construction industry companies are included (White, 2004:63). It is also a description of the frequency of occurrence of a certain characteristic in a sample. In the study of the Iraqi construction industry, the sample includes different types of construction engineers. The decision to select descriptive research and not experimental research was influenced by the fact that descriptive research is about things that have already happened or are ongoing, which, in this case, is the continued performance of TNA in the Iraqi construction industry, as well its inability to determine the training needs for skills and knowledge of the current construction engineers (White, 2004:63). Three main purposes of this research are to describe, explain, and validate findings. Description emerges following creative exploration, and serves to organize the findings in order to fit them with explanations, and then test or validate those explanations (Krathwohl, 1993).

3.3.2. Justification for the philosophy

The philosophical assumptions of the researcher will strongly influence the reasoning behind this research and will influence both the data required and the analysis of the data. In conducting doctoral research, particularly for a PhD study, there is a need to justify the philosophical stance of the researcher; after all, the degree to be awarded is 'Doctor of Philosophy' (Tobi & Amaratunga, 2010). As Saunders *et al*. (2007) argued, research philosophy comprises vital assumptions that will support the research strategy and the chosen research methods as part of that strategy. Research approachability is affected by the research phenomenon under consideration, and when one tries to tackle the research problem(s), questions emerge, influencing the type of paradigm to be used (Remenyi *et al*, 1998; Pollack, 2007). Moreover, when deciding which paradigm to follow, it must be noted how it influences the conceptual model of the study (Miles and Huberman, 1994) and also drives the researcher to create rational and systematic constructs and processes from which variables can be extracted and included in the research. Having expounded the pros and cons of each paradigm, they now need to be applied. However, due to limited time and money, the established methodology for the present research will be the ‘hard’ paradigm alone, as it satisfies the research background. This paradigm paves the way for a convergent and discriminating validity, compared to other relevant literature. Moreover, the basis of the ‘hard’ paradigm makes it suitable for replication purposes. This particular research project adopts an objective orientation, which focuses on uncovering factual findings in the subject area by emphasising causality and generalisation (Ahadzie, 2007; Pollack, 2007). The research is based on modern epistemological and ontological assumptions. The research method used is quantitative in nature, and therefore it is appropriately in-line with the positivist tradition. It is confirmed by Dainty, (2008: 10) that the construction management field emerges to be firmly rooted within the positivist tradition, a tradition that facilitates the application of either pure / or applied research in the built environment. Collins (2010: 38) ‘*suggests that as a philosophy, positivism is in accordance with the empiricist view that knowledge stems from human experience, which portrays the ontological view of the world as comprising discrete, observable elements and events that interact in an observable, determined, and regular manner*’. As a result, positivism is concerned with all phenomena that should be understood via the employment of a scientific method and aims to create a theoretically neutral language of observation by stripping hypotheses and theories of subjective content. It is deterministic; de-emphasising free will, emotion, chance, choice and morality; and it posits a conceptual division between ‘fact’ and ‘value’, in which only empirically provable ideas count as ‘knowledge’ (Tobi & Amaratunga, 2010; Gephart, 1999, Crotty 2003; Strudwick 2009; Collins, 2010: 38).

Figure 3-4 Applied Epistemological, Ontological and Axiological Stances



The positivists usually adopt this methodology in their investigations. This approach has the following strengths according to Castrol *et al*., (2010: 343)

- Generation of comprehensive account of human experiences is possible;
- The accounts are within the context of the observations; and
- An in-depth analysis is possible in a way that cannot be captured by measurement scales.

The limitation of this approach as put forward by Castrol *et al* (2010: 343) is that the ability to make strong conclusion is limited. In summary, this research is based on modern epistemological and ontological assumptions, using quantitative data collection in line with positivism. As mentioned earlier, construction management appears to be of a positivistic root (Dainty, 2008). To define the approach even further, the research has an inclination towards positivism.

3.4. The Methods Adopted for this Research

The research process is planned to pursue the aim of this study: to assessing the skills and knowledge needed in the Iraqi construction industry. In order to achieve this aim, seven research objectives, as stated in Chapter 1, section 1.8, were formulated and the overall research process is developed. Firstly, a literature search was made to review the skills and knowledge needs in the construction industry and the concept of training needs assessment. The survey studies approach was used to investigate the current practices in TNA and skills and knowledge gaps in the Iraqi construction industry. The next stage of the research process is to develop a model for each group of construction engineers (site managers, civil engineers, project leaders and architects). The formative and summative evaluation is used to determine the appropriateness of functionality of the developed model systems in conducting questionnaires and interviews with expertise in construction field. Brief descriptions of the research methods adopted are provided in detail in the following sections.

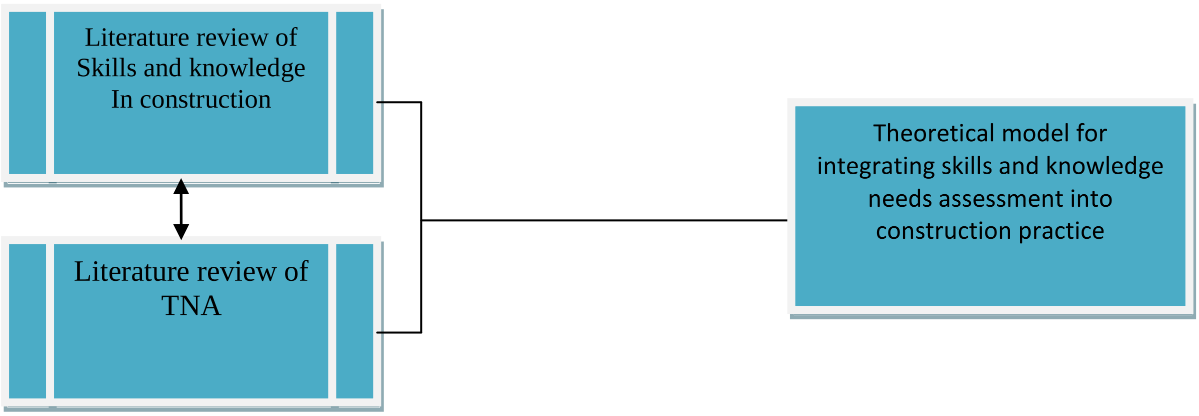
3.4.1 Literature Review

The literature review is a very important part of every research project (Blumberg et al., 2005). Sekaran (1984) said that a literature review is comprised of citations from a wide-ranging review of published work from secondary sources of data in the areas of specific interest to the researcher. The main idea behind a literature review is to make sure that no important variable, that has in the past been found repeatedly to have caused problems, is neglected or ignored (Sekaran, 1984). Hence, the literature should not only be quoted and reviewed, but it is also important that the body of relevant literature from previous research should be critically analysed (Fellows and Liu, 1999). For this research, the literature review was conducted by searching the existing literature on skills and knowledge and TNA in construction projects. In this research, the main role of the literature review is to find a gap in the existing theories, thus providing potential new areas of research. In general, researchers in Arab countries, particularly in Iraq, in the TNA field have not investigated the implementation of the process at all levels. Also, they have not conducted much research on TNA in the context of the construction industry. This is why the journals and reports related to needs assessment for skills and knowledge are valuable to this effort. The task of searching the published literature is made easier through the existence of computer databases, electronic resources portals , electronic journals, computerised catalogues and searches on the internet (i.e. Google scholar). In order to achieve the first, second and third objectives of the research, two main topics were selected to be reviewed; as illustrated in Figure 3-5.

- Current skills and knowledge needs with a view to identifying current problems in site management practices.

- A review of training in the construction industry and TNA concepts, methods and techniques.

Figure 3-5 A Literature Review Search



The literature reviewed on these two subjects helped the researcher to provide a theoretical model for integrating the process of needs assessment for skills and knowledge into construction management practices. The literature review is a continuous process, which will be carried out concurrently with the survey, model development and evaluation stages to highlight new issues or gaps in the current literature.

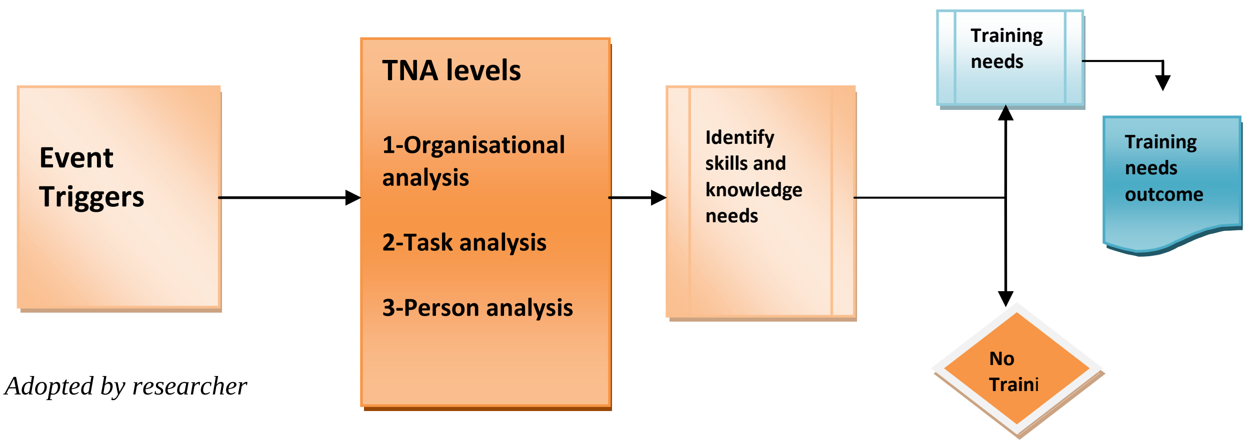
3.4.2 Survey Questionnaire

The use of a survey approach in this study allows an understanding of how different employees perceive their influence on the process of determining training needs and how they would identify the skills that need to be gained in construction organizations in Iraq. Surveys usually take the form of a questionnaire filled out by a respondent alone, or by interview. There are other ways of collecting data: via the internet or other transactions, electronic or otherwise. These data are often used to construct a 'digital persona'- an electronic copy of a person's behaviour and preferences - for marketing and other purposes. This is also a form of 'surveying', but large data sets do not necessarily guarantee meaningful results. In the present study a survey was conducted to identify the training needs of construction employees in Iraqi organizations and also to investigate whether there is a skills and knowledge gap that need to be addressed by training programmes. The findings could contribute to the development and recommendation of solutions to enhance construction skills and knowledge competencies amongst Iraqi engineering employees.

3.4.3 Model Development

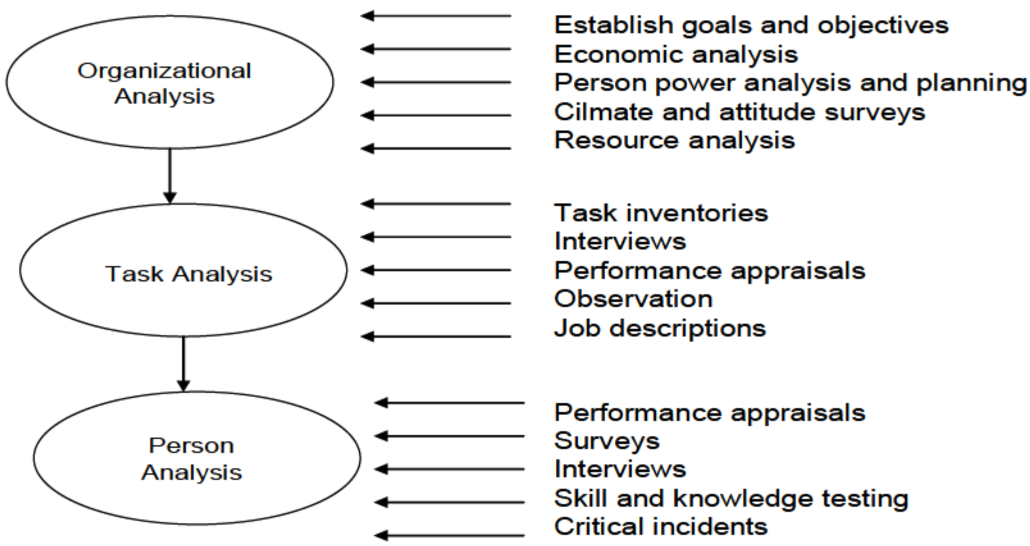
Model is considered as basic designs for visualising objects, processes, and concepts too complex to grasp (Fellows and Lui, 1997). The model must capture and represent the reality being modelled as closely as practical and include the essential features of the reality whilst being easy to use (Fellows and Lui, 1997). The current research method adopted in the study is based on the theoretical model (see figure 3.6) of Sleezer (1993), which supports a holistic approach to training needs analysis. The model requires analyses at the organisational, task, and person levels.

Figure: 3-6 TNA model development



Adopted by researcher

Figure 3-7 Sleezer's three levels of analysis



Source: Sleezer (1993)

This model is based on three levels of analysis: Organisational analysis investigates the organisation's objectives, goals and resource needs in order to determine where training is needed within the organisation. Task analysis examines what tasks must be performed for standards to be achieved, how tasks are performed and what knowledge and skills are needed to perform those tasks, in order to determine training content. Finally, through person analysis the organisation identifies who should receive the training. This is achieved by establishing the level at which each employee is performing in relation to performance standards, usually through performance appraisals (Sleezer, 1993; Miller & Osinski, 1996).

To develop a model for needs assessment in the Iraqi construction industry is to fulfil the seven objectives of this research. Four models were developed for different construction engineering groups such as: site managers, civil engineers, project leaders and architects. These models were achieved through survey study results and are supported by a wide-ranging literature review on TNA and skills and knowledge to facilitate TNA practices on construction projects. The survey study has helped the researcher to identify aspects of skills and knowledge needs in construction management practices. The key findings from the survey are as follows:

- Training is evident in the Iraq construction industry.
- TNA is not constructed comprehensively and needs to be reconsidered.
- A great need exists for construction project management skills and site administration management knowledge.

A needs assessment of construction engineers is made in this study, by considering the skills and knowledge requirements of Iraqi construction organizations. According to the requirements, the following conceptual model is designed for a needs assessment to identify skills and knowledge gaps for all participants in construction engineering groups, such as; site managers and project leaders, civil engineers and architects. The study reveals that a large majority of particpants could benefit from TNA and that there is a skills and knowledge shortage especially in construction management, management and administration of sites by construction organizations. Therefore, the engineering workforces do perceive the importancce of TNA and they do feel the need for training to fill the skills and knowledge gaps in their organizations. To overcome this deficiency in skills and knowledge a conceptual model has to be put in place and to be followed for the training needs programme to be emperical. In this study attempts have been made to propose a TNA model for construction engineering that is based on emperical evidence. The model is divided into Four phases: trigger , input, procccesses and output. Details of these phases are given below.

3.4.3.1 Trigger event

The main purpose of the this phase is to anlyse the existing situation and identfiy the deficency for construction engineering. It starts with an analysis triggering factor, such as: a site management admininstration problem, a commincation problem, a lack of skills or knowladge or a technical problem. At this stage, a diagnosis of construction site management administration problems in consrtruction engineering is made to determine the TNA process. The appropriate model for a training needs gap in construction engineering may be designed based on some empirical evidence regarding skills and knowledge needs. Based on data collection for the respondents, findings and conclusions were drawn; therefore, the model, which is designed, based on identified needs would be the appropriate model for training needs for construction engineering companies.

3.4.3.2 Input Phase Driver for Needs Assessment

The input phase consists of an organizational analysis, an operational analysis, a personal analysis, TNA methods, criteria and barriers. TNA methods and techniques processes help to identifying training needs.

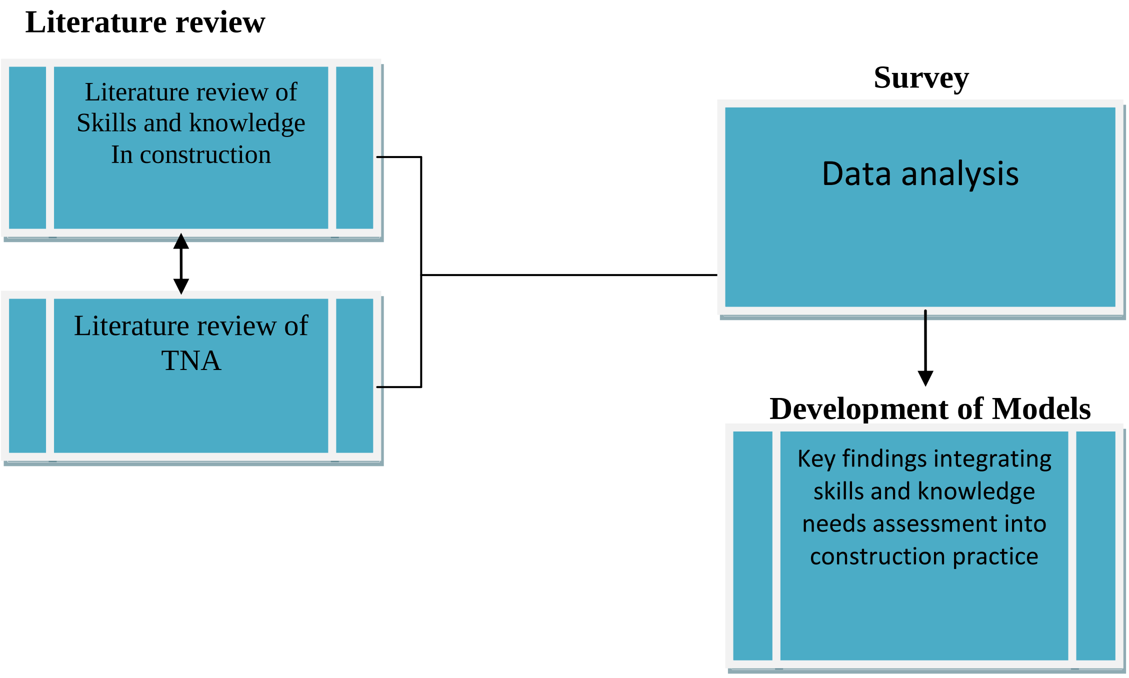
3.4.3.3 Process Phase

In the process phase, the TNA analysis provides information on expected skills and knowledge that are needed in the Iraqi construction industry

3.4.3.4 Output Phase

The output phase is a conclusion as to whether the model indicates either training or non-training needs, and in some cases, both, and indicates the TNA outcome. This model provides a structured approach to assess skills and knowledge needs in the Iraqi construction industry. Figure 3-8 shows the connection between the literature review stage and the survey studies stage with the model development stage. Chapter 5 will provide in-detail discussion on the framework development process for this research project.

Figure 3-8 the linkage between the literature review stage and survey study stage with the model development stage



3.4.4 Evaluation of the model System

There are two sorts of research evaluation identified by Neuman (2006); these are known as formative and summative. Formative evaluation is built-in monitoring or continuous feedback on a programme used for programme management and capture during development of the system. On other hand, summative evaluation looks at final programme outcomes and takes place after development of the system. These two types of evaluation are generally essential to show how well a programme is working or reaching its aims and objectives. Table 3-1 shows the comparison between summative evaluation and formative evaluation.

Table 3-1 Comparison between Summative Evaluation and Formative Evaluation

Criteria	Summative Evaluation	Formative Evaluation
Purpose	• Determine effectiveness of human interventions and actions	• Improve an intervention
Focus	• Goals of the interventions	• Strength and weakness of the specific program.
Desired Results	• Judgements and generalisations about effectiveness types of interventions and the conditions under which those efforts are effective	• Recommendations for improvements
Level of Generalisation	• All interventions with similar Goals	• Limited to specific setting studied

Source: (Patton, 2002)

An evaluation session in this study is conducted to determine the appropriateness and functionality of the developed model in assessing employees' skills and knowledge in the construction industry. Five construction experts were willing to participate in the evaluation of the model with their feedback. These five people were asked to complete a questionnaire, followed by open discussions to get further feedback and suggestions from the participants, after which, participants were asked to complete a further questionnaire. The model was evaluated using questionnaire survey techniques: closed questions and open-ended questions. Closed questions limit the respondent's answer to the survey and allowed them only to choose either a pre-existing set of rating scale responses: i.e. 1-strongly agree, 2-agree, 3-neutral, 4-disagree, 5-strongly disagree. The feedback by participants was aimed to assess the appropriateness of the model and obtain comments for improving the model. The discussion of the evaluation process of the model is explained in Chapter 6. The research methods adopted to achieve the research objectives are summarised in Table 3-2.

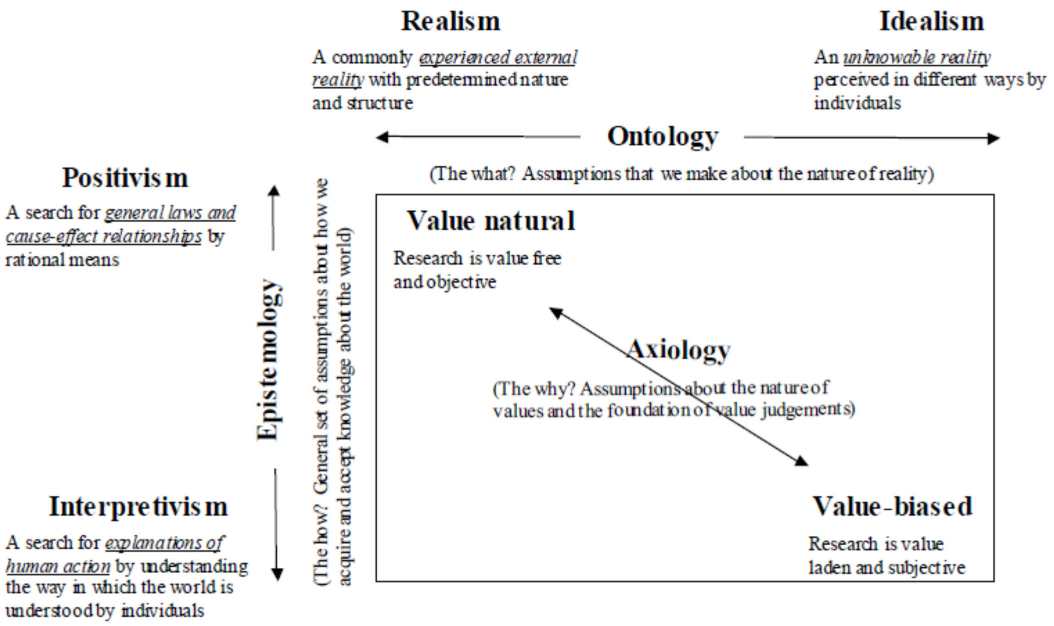
Table 3-2: Research Methodology Adopted

Research objective	Research Methodology			
	Literature review	Survey study	Model development	Formative and summative evaluation
To conduct critical literature reviews on the theories, frameworks and schools of thought relating to construction management, training needs and the development of skills and knowledge	X			
To identify the drivers and barriers to conducting TNA in Iraqi construction organizations	X			
To explore the nature of existing TNA offered by Iraqi construction companies.	X	X		
To conceptualise a model that integrates the research findings of the training needs of employees in selected construction organizations in Iraq			X	X
To test, refine and validate the model in terms of assessing training needs for construction projects in Iraq				X

The research needs are satisfied with a variety of research methods, which are not classified according to their merits (Wilkinson & Birmingham, 2003). This, however, does not leave the question of the selection process open, for some are more suited than others to one particular type of research. There must be appropriate explicit reasons given as to why one particular research method is selected rather than another (Denscombe, 2003). Otherwise, the research could suffer from the outset, or the research findings may be open to criticism and doubt (Denscombe, 2003). In order to choose between these two research methods, i.e. case studies or surveys, the research questions were also drawn upon by referring to Table 3-7. The table below provides the possibilities of matching research questions to the choice of potential research tool. The main research questions involved in the study suggest that either surveys or case studies could have been suitable as the research method (Pathirage, 2005).

The epistemological, ontological and axiological assumptions behind this study narrowed the appropriate research methods to experiments, case-studies or surveys (3-9). But, since there was no lab environment, i.e. no controlled variables to deal with, experimentation was ruled out of this study (Yin, 2003). In a case study, an empirical real-life enquiry investigating an occurrence of some sort is conducted, while in surveys, one must select a proportion(s) of a population(s), as a sample(s) to be investigated using a questionnaire(s) (Yin, 2003).

Figure 3-9 Influence of research philosophy on the choice of research instruments



Source: (Sexton, 2004)

Case-studies are more suited to establishing inductive reasoning or theory building, while this study is aimed at establishing conclusions from existing generalizations, i.e. a deductive process from a general situation. Therefore, the choice of either a case-study or survey, was now narrowed to one choice; that of a survey-based method.

Research questions were drawn-up with reference to the framework in Table 3-3. It was thought that the framework of this questionnaire had the potential to match the requirements of the research methods. The survey instrument (method) comprised of a survey, in the form of a questionnaire, sent by post or otherwise. Questionnaires were used to collect data, evaluate aspects of it and for validation exercises of the output of the results (data). This is described in section 3.7.2.1**.** The next section provides further details of these methods

Table 3-3 Cross-categorisation and matching of the research Question type and research strategy

Strategy	Type of Research Question	Is control of behaviour required?	Is there focus on contemporary events?
Experiment	How? , why?	Yes	Yes
Survey	Who? , What? , Where? , How Many? , How much?	No	Yes
Archival Analysis	Who? , What? , Where? , How Many? , How much?	No	Yes/No
History	How? , Why?	No	No
Case study	How?, Why? What?	No	Yes

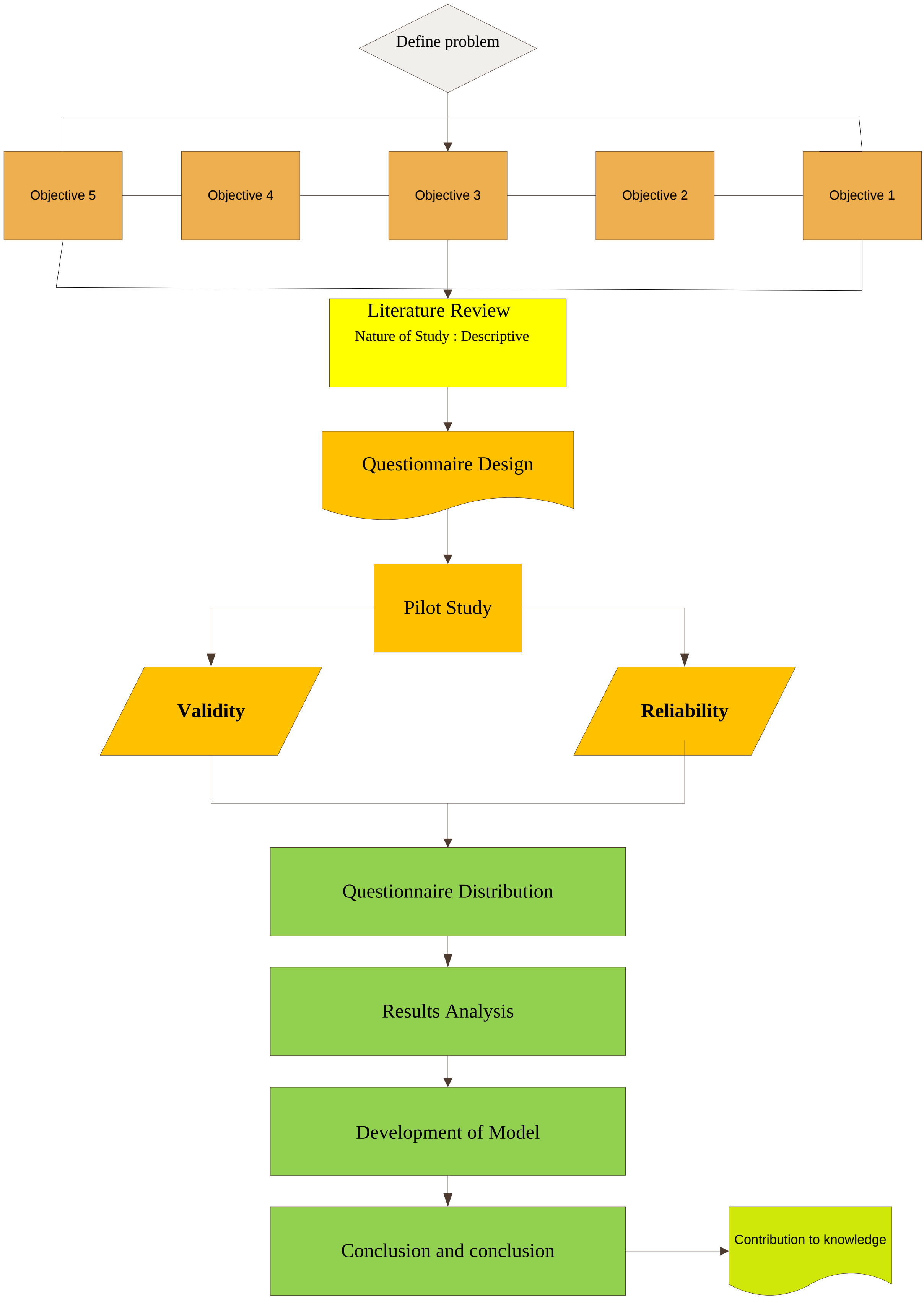
Sources: (Bailey, 2005; Chinyio, 1999)

3. 5 Research Design

The study is descriptive in nature as its aim is to describe approaches and methods that organizations adopted in their TNA practices in Iraqi construction firms. The design of any research provides the general framework for the acquisition and analysis of data associated with the phenomenon under investigation (Bryman, 2008). The term, research design, has been defined as: The programme that guides the investigator in the process of collecting, analysing, and interpreting observations. It is a logical model of proof that allows the researcher to draw inferences concerning causal relations among the variables under investigation (Nachmias & Nachmias, 1982). Research design refers to the framework that helps with data collection and analysis. It is a guideline that links the various elements of the research methodology (Okolei, 2011). Altarawneh, (2005) pointed out that research design is about organising research activities, such as data collection, and analysing them based on systematic methods that help to fulfil the research aims. Saunders *et al*. (2000) affirmed that having a clear research design (strategy) could be an essential plan for how you go about answering the research questions; that research design must include clear objectives, which result from the research questions. In addition, it has to assist the researcher in recognising the correct sources for data collection, the allocated time, the location and any ethical issues. Sekaran (2003) suggests that research design includes a series of rational decisions such as: identifying the purpose of the study; whether it is exploratory, descriptive or hypothesis-testing; identifying the type of investigation; deciding the extent of the researcher's intervention; identifying the study’s setting; deciding on measurements and measures; deciding on data analysis; deciding on data collection methods; deciding on the time horizon; deciding on the sampling design and identifying the units for analysis (Altarawneh, 2005; Denzin & Lincoln, 2000).

A quantitative approach is taken in the present study, which refers to studies where findings are mainly the product of statistical summary and analysis (Brink, 2007; Babbie & Mouton 2002). Furthermore, quantitative studies allow constructs by assigning numbers to indicate the severity of the constructs being measured. The present study focuses on measuring the training needs of Iraqi construction engineers employed by the construction industry. The key issue of this thesis is indicated in the literature review and derived from generally accepted facts about the problem under investigation. Thus, the review helped to identify and understand the theories, models and concepts used in previous studies on training needs and skills needs assessments of construction employees. Basically, the review further assisted the researcher with clearly identifying unresolved problems in the study area, which form the main focus of this thesis. A number of designs are available for the researcher to choose dependent on the research problem and the associated objectives. In this study the main research tool was the survey; the design of the study is shown schematically in the following diagram (see Figure 3-10):

Figure 3-10 Research design



The research study is descriptive in nature. The main purpose of this study is to identify TNA for Iraqi construction workforces. Descriptive research is a form of quantitative research that involves carefully describing training needs phenomena. Descriptive studies are concerned primarily with determining what exists. Descriptive research answers the questions: who, what, where, when and how? The descriptions are used for frequencies, means and other statistical calculations. Often the best approach, prior to writing descriptively is to conduct an investigation by survey.

3.6 Justification for Research Type Method

The major Human Resource Management (HRM) studies are backed-up by quantitative analyses and are thus safe enough to presume valid and reliable. The nature of problems faced in construction management may be responsible for the predominance of the quantitative approach to empirical research in built environment disciplines. Due to the nature of this study, the quantitative approach, which is a scientific method, is adopted because the need for rigour and objectivity is believed crucial to the research outcome. The literature has demonstrated that construction engineering companies face skills and knowledge problems and a lack of proper training programmes (Bryman and Cramer, 2009; (MTEN, 2006). Therefore, an investigation was launched to look at the true picture of the Iraqi construction companies' situation. As for the ontological issue of what is real, the quantitative researcher views reality as "objective". Here in this study, the researcher attempts to know how things really are and how things really work in the studied population (Guba & Lincoln, 1994 Amaratunga *et al.*, 2002); to study something that can be measured objectively by using a questionnaire as an instrument.

In this study quantitative data are evaluated using descriptive and inferential statistics. A quantitative approach, using a survey, had been identified as appropriate for this study in totality (Tobi & Amaratunga, 2010). It was found that a quantitative approach was suitable and preferable due to the nature of the inquiry. Quantitative researcher tend to rely more heavily on deductive reasoning, beginning with certain premises (e.g., hypotheses, theories) and then drawing logical conclusions from them (Abdullah, 2003) . Quantitative methods can provide a wide coverage of a range of situations and they can be fast and economical with statistics aggregated from large samples; they may be of considerable relevance to policy decisions (Easterby-Smith 1991; Saunders *et al.,* 2007). Quantitative methodologist is only done by statistics and statistical methods. Therefore, quantitative research is seen as more representative and reliable to researcher than qualitative. Its emphasis on systematic statistical analysis helps the researcher in this study to ensure that findings and interpretations are robust (Devine, 2002). It is a research method that is deeply rooted in positivism and their epistemological orientation. Having expounded the reasons for selecting a quantitative approach in this research in general, a quantitative technique is also adopted for the second phase, so that familiarity with concepts or problems is achieved. Some data obtained from the data collection phase of the research will be converted into numerical form, which helps in the process of extracting information related to facts and causes of behaviour, and therefore, the selection of a quantitative technique. This made the data collection phase a hybrid, combining both qualitative and quantitative features.

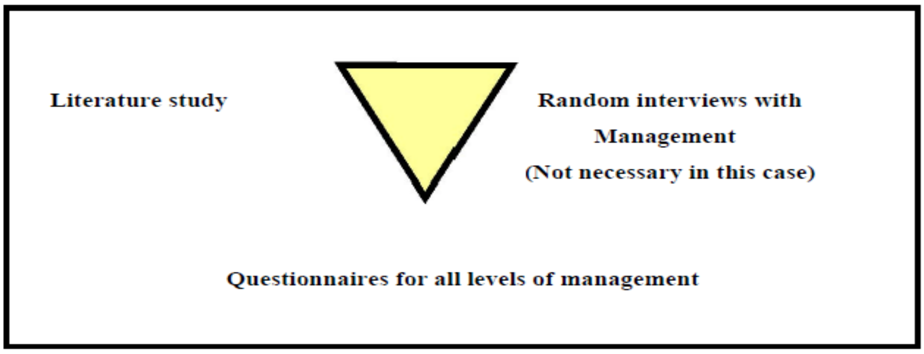
This research began by collecting people's thoughts and opinions on TNA and skills assessment in their construction organizations. TNA was perceived differently by different employees, as is the case with social phenomena. It was decided that this study would attempt to understand the working of construction companies, as perceived and conceived by those participants who may have constructed some of the meanings and contexts making up their products and/or organizations. TNA, being a social construction, was presumed to have some social values as premises that are necessarily affected by a multiplicity of factors within a given context. The argument just presented splits the data-related collection and analytical stages of the research into two phases. In the first phase, issues that deal with opinions, perceptions and conceptions are contextualised, precisely defined and weighed-up for their suitability; and the required data is identified. This last argument points to a qualitative exercise being used, which was thought to be suitable for the outlined purposes; this concludes the first phase. Now the second phase kicks-in. The second phase is concerned with how to facilitate the collection of the required data. During this study, a quantitative approach was used for investigative purposes, since this can be used in descriptive research as pointed out above. In carrying out a quantitative technique, some of the data obtained is be converted into numerical form, which assists in the process of extracting information. This makes the data collection stage a hybrid type, combining both qualitative and quantitative features. It is for all the reasons above that this study adopts a quantitative research strategy as the most appropriate for understanding how construction firms in Iraq are responding to the TNA and skills needs, as related to the construction industry. By employing survey methods to conduct this study, the aim is to capture, quantitatively, as much of the real position as possible of the response of Iraqi construction firms. This research investigates at all the relevant related aspects of training needs and skills needs. The data obtained from chosen construction companies are transformed using deduction techniques into a sizeable, workable and useful database. Statistical analysis of the data makes the data presentable in the form of figures and tables. The research begins with a theoretical position (assumptions) and moved towards concrete empirical evidence, through the process of rigorously testing the hypotheses

3.7 Data Collection

3.7.1 Triangulation

The term 'triangulation' refers '*to the use of more than one source of data and more than one theory to support the arguments and conclusions. More than one investigator may be used to collect the data to make findings more reliable'* (Babbie and Mouton, 2002: 275). According to Brink, (2007: 8) citing White, (2004: 20), triangulation is composed of three categories: literature study, interviews and questionnaires. The researcher in this study will primarily focus on two of the three categories, i.e. literature study and questionnaires (see Figure 3-11).

Figure 3-11 The triangulation process used by the researcher for data collection



Source: (White 2004)

3.7.2 Data Collection Techniques

After completing the literature review the data collection method most suitable for this research had to be decided. Data collection is important to fulfil the aims and objectives and to complete the research (Fellows & Liu 2008). Data collection methods can be classified into primary and secondary data collection (Naoum 2007). In this study, multiple data sources were used, such as primary and secondary data sources. Sources of primary data are case studies, whereas secondary data is obtained from previously conducted studies, published books, journal articles, the internet, reports and assorted documents. Most of the secondary data sources used here are referred to in the literature review. Data collection aims to transfer information professionally from respondents to researcher; data collection is a complex and difficult process; therefore it is sometimes restricted by time, cost and confidentiality (Kaixian, 2011). Hence, attention must be paid to these factors when selecting methods for data collection (Fellows & Liu, 2008).

This research aims to determine people's thoughts and opinions on TNA and skills assessment in their construction organizations. TNA is perceived differently by different employees, as is the case with any social phenomena. In the study attempts are be made to understand the workings of construction companies as perceived and conceived by those participants who constructed the meanings and contexts making up their products and/or organization. TNA being a social construction is contemplated as having some social values as premises that are affected by a multiplicity of factors within a given context. This research looks at all relevant related aspects of training needs and skills needs. The data, from the chosen construction companies are transformed, by reduction, into a sizeable, workable, database. Statistical analysis of the data makes the process of presenting them in the form of figures and tables possible. This research looks at all relevant related aspects of training needs and skills needs. The survey approach used here involves acquiring information about one or more groups of people by asking them questions and organising their answers. Surveys can be categorized as questionnaires, interviews or both (Fellows & Liu, 2008; Cooper & Schindler, 2006; Dawson, 2007). A survey has been described '*as a study where the variables can be controlled by means of a sample, as well as specific methods, such as questionnaire*s' (Leyds 2005). Some have argued that surveys can be categorized into descriptive and analytical surveys (Kaixian, 2011; Fellows & Liu, 2008). Descriptive surveys are designed to determine the number of responses to a certain topic, while analytical surveys are aimed at establishing relationships between questions, either dependently or independently; this study uses an analytical survey (Naoum, 2007). Surveys are a tool for collecting primary data. In this study, a survey is used in the form of a questionnaire to collect data due to time and distance constraints (Naoum, 2007; Adetunji, 2005).

3.7.2.1 Questionnaire

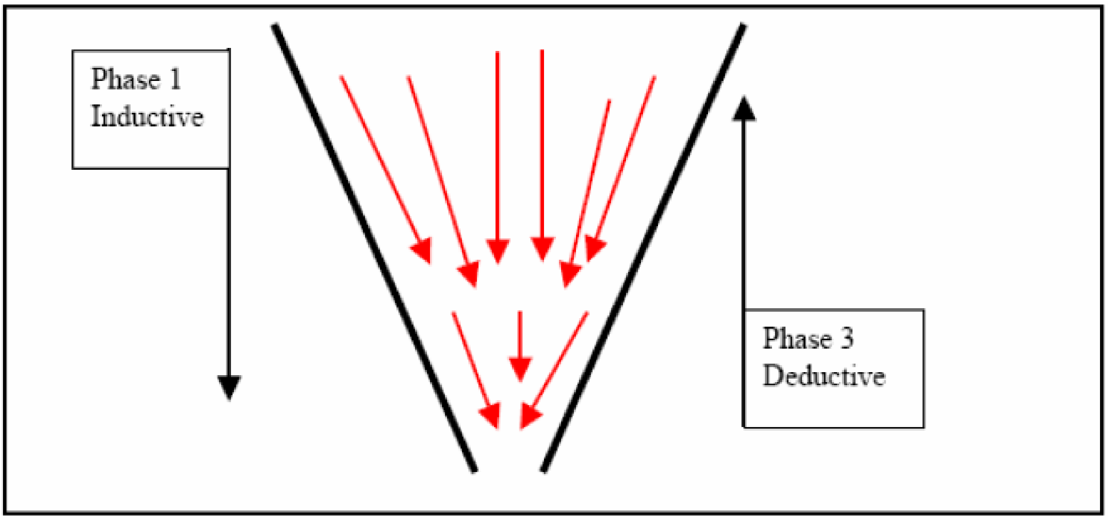
According to White (2004: 88), '*a questionnaire is an instrument consisting of open and closed questions to which a respondent must react. This technique is used to obtain information for a specific topic'*. The aim and objectives of this study are based on the questions or research problems. The questionnaire for this study will include topics such as skills and knowledge needs; and TNA methods and levels. Data analysis will consist of inductive and deductive processes categorised into three stages (see Figure 3.12):

Stage 1 of the literature study will have an inductive approach.

Stage 2 of the literature study will be a draft questionnaire followed by a final questionnaire.

Stage 3 will have a deductive approach.

Figure 3-12 The inductive and deductive processes used for data analysis



Source: (White, 2004)

As pointed out in figure 3.12 the deductive approach is adopted for this study, as it allows the researcher applying the theories to specific situations and develop a hypothesis ,and then design a research model to test the hypothesis. The main reason for using deductive, it helps to get straight to the point, and can therefore be time-saving.

Table 3-4: Differences between deductive and inductive approaches

Deduction	Induction
More scientific principles	Gives an understanding of the meanings people attach to various contexts
Move from theory to data	Gives an understanding of the research context
Emphasis on quantitative data	Emphasis on qualitative data
A structured approach	A flexible approach which allows a change of emphasis as the project continues
The researcher is separate from the process	The researcher is part of rather than separate from the research process
Need to generalise results by selecting sample of sufficient size	Less need to generalise results
Need to explain causal relationships between variables	

Questionnaires are data collection strategies that are intended to produce answers or reactions to pre-arranged questions presented in a specific order (Nahiduzzaman 2006). In fact, there are few examples of questionnaires being used in qualitative research in the literature and these are mainly case-studies. This is, perhaps, due to questionnaires being recognized more as quantitative, than qualitative data collection instruments (Thomas, 2006; Okolie, 2011). The questionnaires planned for the study are structured. Structured questionnaires include simple, multiple choice and closed questions (Brink, 2007; Babbie and Mouton, 2002). A biographical questionnaire is used to obtain accurate information about respondents, with respect to the following: age, occupational status and work history. Biographical data are essential, as biographical factors could play a role in differences found between subjects (Brink 2007). As an example, subjects of different age groups and with different work experience could attach different meanings to their training or skills needs. Both descriptive and analytical questions are asked in questionnaires. The main objectives of using the questionnaires in this study are firstly, to provide descriptive information about targeted construction companies, and secondly, to help with data collection from employees on the subjective/qualitative aspects of TNA in construction organizations and also to assist with finding statistically significant predictors of training needs in target companies. The main advantage of a questionnaire is that many employees can complete it at the same time, thus, confidentiality can be assured (Okolie, 2011). The data from the questionnaire are organized and sent for statistical analysis. This analysis is then interpreted in order to make recommendations to construction companies on the training needs of employees. The questionnaire is selected as a data collection method instead of an interview for several reasons:

- **Cost saving**: web questionnaires do not cost much compared to interviews, which need to be carried out via telephone or in person. International phone calls and travel would be costly (Kaixian, 2011). Therefore, questionnaires are the most economical and practical instrument with which to gather data.
- **Convenience**: a questionnaire is more convenient for respondents as they can be filled out in their free time. Interviews need to be arranged at specific times, which are convenient for both the interviewer and the interviewee. Face-to-face interviews are almost impossible for this study due to the distances involved. Questionnaires allow a wider coverage of the geographical area to obtain more widely distributed results (Kaixian, 2011).
- **Timesaving**: web questionnaires are easy and quick to complete and responses can be obtained immediately.

Some tactics were used in order to develop a good questionnaire. Firstly, some questionnaires are chosen from previous research studies (Reed & Vakola, 2006; O'Donnell & Garavan, 1997; Iqbal, 2011; Iqbal, 2005; Hassan, 2006; O'Driscoll & Taylor, 1992; Agnaia, 1996; Gray, *et al.*, 1997; Elbadri, 2001; Bowman & Wilson, 2008; Brown, 2002; Cekada, 2010; Jamil, 2006) and are reviewed and amended to suit the context of this study. Adapting other questions is considered to result in the design of a more valid and reliable questionnaire.

Secondly, a draft of the questionnaire is also reviewed by a consultant supervisor and by other people with experience in the field of construction management. Comments are taken into account and used as guidelines to improve the survey instrument. The questionnaire is divided into eight sections. Each section is designed to achieve the study objectives, as stated in Chapter 1. A sample of the questionnaire is shown in Appendix A and a summary of the items in the questionnaire is presented below in Table 3-5.

Table 3-5 Questionnaire sections and items

Section	Descriptions	No. of Questions
1	Background of respondent	4
2	Construction site management problems	4
3	Training needs indicators and barriers to training needs	11
4	Methods used in determining needs of T&D	10
5	Techniques used in conducting TNA	12
6	TNA criteria	5
7	Perceptions of TNA Practice	8
8	Skills and knowledge needs assessment	24
	Total items	**78**

3.7.2. 2 Research Sample and Population

The population of this study consists of 239 construction engineers from different management levels and backgrounds: site manager, project leader, civil engineer and architect. This study targets 317 selected participants representing eight companies in the Iraqi construction industry. Table 3-6 shows that only 239 questionnaires were returned of which 72.4% were complete; 28.7% were incomplete and thus rejected. The questionnaire return rate was high, and considered good for statistical analysis with more accurate representations of the entire.

Sampling methods are broadly categorised into two groups by researchers, non-random (or judgment) sampling and random (or probability) sampling. This study use the probability sampling, which each member of a given research population has an equal chance of being selected. This type of sampling is more likely if the theoretical orientation of the research is positivist, and the methodology used is likely to be quantitative and this sample is simple and less expensive to use (Ray and Mondal, 1999). Due to the un-settled security and political situation in Iraq, it was not easy, if at all possible, for the researcher to do my enquiries about construction companies beyond the middle and the southern regions of Iraq

The western part of Iraq was thought to be unsafe for the researcher to conduct any research there. Therefore, the companies that the researcher dealt with were based in the other regions of Iraq. This situation may be thought of as a strata sampling selection criterion, in the sense that the two selected regions of Iraq represented a geo-political homogenous regions that are different to that of Kurdish and the western regions of Iraq. Moreover, these regions represent areas where the capital Baghdad (the largest city in Iraq) lies. Adding to these issues the fact that these regions produce most of Iraq's oil. Moreover, Basra, the only port, and the second or the third largest city in Iraq, also lies in this region. So this region represents an economic base for Iraq, with huge prospect and possibilities for Iraq's construction industry. The other strata selection criterion is size. The researcher selected two of the biggest companies, as well as two middle-size ones. The number of employees of the biggest companies is of the order of about 3000, while that of the middle-size ones is about 200. Therefore, taking all above issues into consideration, the researcher can safely say that the research data sampling selection criteria is that of a stratified random statistical sampling technique, the strata being those mentioned above. The main benefit of this method is to ensure that cases from smaller strata of the population are included in sufficient numbers to allow comparison. This makes it likely to obtain a sample that is big enough to enable researcher of this study to draw valid conclusions about a relatively small group without having to collect an unnecessarily large.

Table 3-6 frequencies and percentages of classification questions

Variable	Classification	Frequency	Percentage
Number of responses	Yes	239	72.4
	No	91	27.6
Age groups	25-30	50	20.9
	31-40	74	22.4
	41-50	97	40.6
	51-60	16	6.7
	61-70	2	8
Work experience	0-2Yrs	33	13.8
	3-5Yrs	84	35.1
	6-10Yrs	91	41.0
	11-20 Yrs.	24	10

Respondent type	Site manager	82	34.3
	Civil engineer	64	26.8
	Project leader Eng.	33	14.5
	Architect	60	25.1
Company size	Large	62	26.6
	Medium	98	42.1
	Small	73	31.3

3.8. Pilot Testing

Before the questionnaire was put into its final form, a pilot study was carried out in order to get rid of any uncertainty in the phrasing or choice of words. Saunders *et al.* (2003) reasoned that '*the purpose of the pilot test is to refine the questionnaire…*' This makes it much less likely that the respondents will have any issues with the questions, or with the whole exercise. Moreover, a test exercise enables the researcher to have early feedback about the eventual intended project. The validity of the questions can then be checked and the data eventually collected assessed accordingly (Saunders *et al*., 2003). Here, an initial pilot study was conducted. The period that lapsed before the final questionnaire was conducted was between December 2011 and the first of February 2012, during which time a number of activities were carried out.

- Since the intended participants were Arab employees, an Arabic copy of the questionnaires was sent to them, in order to avoid any ambiguity with respect to language due to the wording of the English language version. This would also make respondents more relaxed whilst answering the questions; something that is needed to obtain accurate answers. Also, to confirm the clarity of instructions and that the layout was as clear and attractive as possible, a pilot study was conducted by the researcher's supervisor at the first stage. This was more concerned with the content of the questionnaire. His comments were taken into account in the final construction of the questionnaire.

- The questionnaire was returned to the researcher's supervisor. This, and the next step, and the pilot test are all part of what is known as a 'formative evaluation'. According to Weston, McAlpine, & Bordonaro (1995), the benefits of a 'formative evaluation' exercise are validation, or making sure that the intended goals of the instruction are adhered to and achievable, and improving the instructions themselves, if deemed necessary, by identifying any problematic aspects.

- The second step was to present the questionnaire to 10 experts and specialists, some of whom were academic staff specializing in construction management, at both Salford University and Baghdad University, and some managers in the construction field. They gave much-appreciated, timely and beneficial opinions, on both the content and format of the questionnaire. As mentioned above, this ties in with the 'formative evaluation' exercise.

- In the final step, questionnaires were translated first by the researcher, and then by others with translation expertises in both Arabic and English languages, some of whom were academic staff at Baghdad University, specializing in the field of management. It was back translated to make sure that the meaning of the questionnaire had been preserved and not lost in translation. All agreed that there were no major discrepancies between the translated and the original text.

The questionnaire contains all the independent variables of TNA indicators: construction site management problems, barriers to training needs, dependent variables of TNA and perceptions of TNA. All constructs, independent variables and dependent variables, were measured by a 5-point Likert scale in this study. The justification for using the Likert scale is that it is more suited to situations where items are assessed as statements (Cooper & Emory, 1995). Following the recommendations of Leech, Barrett & Morgan (2005), a high value mark, (or code) is set to the 'agree' answer. Respondents' answers which are marked as 'strongly agree', are given the numerical value 5; 'strongly disagree' is assigned 1. Similarly, 'never' is assigned 1 and 'always' is given 5. 'Not important' is assigned a value of 1; 'very important' is given 5. The Statistical Package for Social Science software package (SPSS) (v 19.0) is used for the purposes of statistical analysis. As data are entered, through the SPSS data editor, each code of for a variable is, then, tested and checked, manually, for each response. It is always advisable to carry out one or more pilot surveys before starting the main data collection exercise. The double-translation process was still used, and once the translation was complete, the survey was delivered to a pilot group.

Ticehurst & Veal (2000) said the purpose of a pilot surveys is

1) Testing questionnaire wording

2) Testing question sequencing

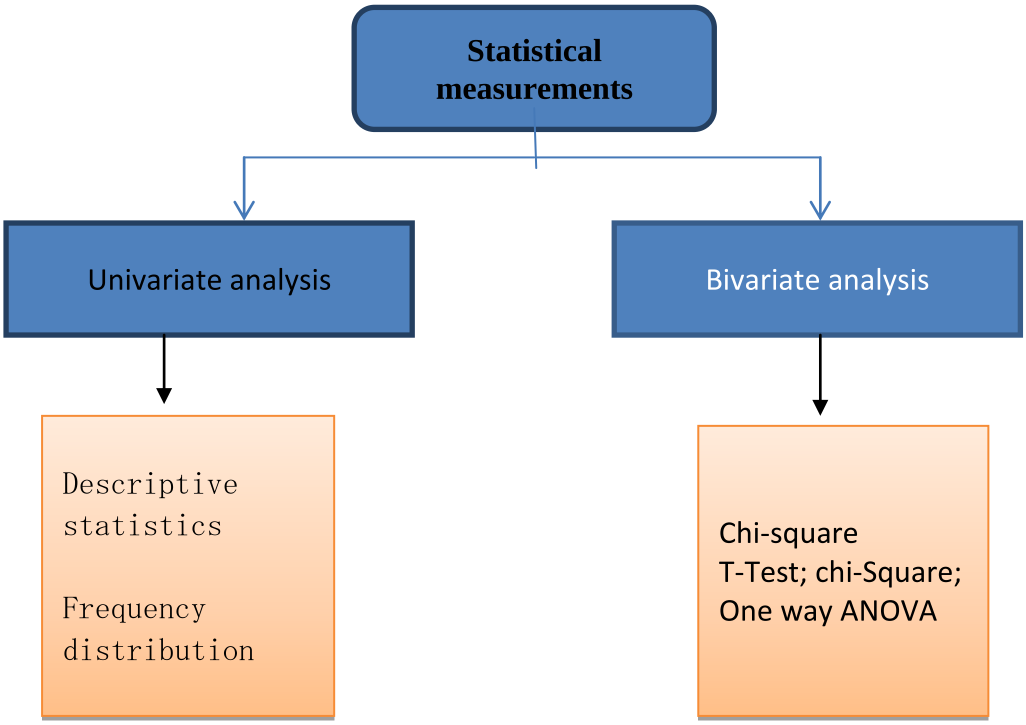
3) Testing questionnaire layout

4) Gaining familiarity with respondents.

3.9 Techniques Used for Statistical Analysis

There are several statistical techniques and statistical procedures available and/or performed, to carry out statistical analysis. To expound on this, a theoretical outline is given below, as well as an explanation of how procedures and techniques are used. The methods used to analyse the data obtained from the questionnaire are as follows: the data are mainly quantitative, hence the use of SPSS version of 19 (SPSS, 2006; Abera, 2009) to perform the statistical analysis and to answer the research questions. Data are tabulated into Excel data sheets to be imported into SPSS. Three types of statistical analysis exist: univariate analysis, bivariate analysis and multivariate analysis. The following figure (Figure 3-13) provides clear details of the design of the statistical analysis used in this research. Initially, univariate analysis – descriptive statistics, independent t-test and frequency distributions - are carried out. The reason for this is to try to understand what the data collected could offer in terms of information; by interpretation and using the findings of the quantitative technique, a clearer picture of reality is achieved. An Analysis of Variance (ANOVA) test is also carried out. The reason for using this technique is to analyse and compare the views of various groups of construction engineers, in relation to issues of management on construction sites. This analysis is also aimed at identifying TNA indicators and barriers to its goals and aims, and the methods used to conduct TNA. As for testing the hypothesis, an independent t-test is carried out. For deducing general information descriptive statistics are appropriate. Demographic statistics for general information about respondents are performed. In order to find out if the model is accepted or not, a reliability test with Alpha Cronbach for measuring internal consistency is performed (Horan, 2010).

Figure 3-13 Statistical analysis techniques



Source: Developed by researcher

The research is to be conducted in the context of Iraqi construction organizations. The study is designed to explore current TNA practice, including methods and techniques, and to identify all the problems, drivers and gaps in training, which might be approached quantitatively. As mentioned earlier in this Chapter and in Chapter 2, there is a lack of previous empirical studies conducted in the field of TNA in Arab organizations and a lack of studies on TNA against which hypotheses could be tested. Statistical analysis of the quantitative data collected here, will make summarizing, comparing and generalization relatively easy and accurate (Bryman, 1988).

3.9.1. Univariate Analysis

As the name suggests a univariate analysis deals with a single variable. One variable, does not mean a single way of looking at things, but as Bryman and Cramer (2001, p5) defined it, '*the various ways of analyzing and presenting the information relating to a single variable'.* The main treatments concerned with univariate analysis are concerned with: frequency distribution, dispersion and central tendencies, as means to extract information from the analysis. The nature of the variable in question defines the type of analysis that is most suitable for such a variable. For example: some treatments are suitable for continuous - or interval nature - types of variables, while others are not; as is the case with leverage and total assets (Abusalama, 2008; Babbie *et al*, 2003, p76). This necessitates identification of the categorical form of the variables in the first instance before initiating the analytical process, so that the right statistical tools can be used for the relevant analytical purpose (Bryman & Cramer 2001).

As for the statistical features, particularly descriptive ones – so called for their ability to give a general outline description of the sample, such as the mean, minimum and maximum and standard deviation - they are of the univariate analysis type and may be applied to those variables that are of a continuous nature (Bryman & Cramer 2001).

Information is not a stack of raw data that is just collected for analysis, but might be the outcomes of the application of certain analytical tools. This point is confirmed by Abusalama (2008) in that it is customary to refer to what comes out of statistical analysis as 'information', but raw numbers as 'data'.

Therefore, the application of descriptive statistical tools to raw data is required to try to make sense, or derive information from them. Data tables need to be adjusted and categorized to determine certain data frequencies and types, and to find out what the variables are and whether they are continuous or not.

Certain sub-definitions must be adhered to to label data, for example: the mean, which is the average of all values of a variable, is called a 'sample mean' if the data collected represents a sample of a larger population; and is called 'population', if it represents the whole population.

The 'standard deviation' (Albright *et al.*, 2006: 33; Abusalama, 2008) is, according to Wegner (2002, 92), described as a statistical measure which expresses the average deviation about the mean in the original units of the random variables. The purpose of using descriptive statistics (frequencies, means and standard deviations) is to give a description of the sample. Raw data are obtained and scores rearranged and grouped in various ways so that an overall picture of the data is obtained. When large volumes of data are gathered from a variety of sources, the essential information contained within it should be organized, summarized and extracted, for communication (Wegner, 2002: 5).

3.9.2. Bivariate Analysis

There are a few statistical tools that can be used to analyse data. The differences between them are the outcomes that come with their usage, found through significance tests. These are:

3.9.2.1 The independent t-test (2-sample t-test)

Statistics of parameters relating to two means are tested for statistical significance to see if they differ from one another enough, statistically, to merit a rejection of either: i.e. whether they are somehow representative of the population, according to some prescribed criteria.

According to Brace *et al.* (2003) and Abusalama (2008) there are three types of t-test: the single, the independent and the paired t-test. Data, in this study, comes from more than one group and the groups are treated as being independent of each other. Having the prescribed requirements, it is thought that the independent t-test is an appropriate choice. These groups or actors are: civil engineers, project engineers, architects and site managers. However, to implement the t-test, it needs to be run a few times, to cross-check for population sourcing. This is a bit tedious, so a more suitable test, ANOVA, is used (Brace *et al.*, 2003).

3.9.2.2 ANOVA

The one-way ANOVA is an extension of the independent t-test in that it is a statistical method for studying sampled-data relationships and focuses on the differences that appear amongst the means of the groups (Cohen 1995).

ANOVA allows for testing two or more samples, thus being considered as an extension of the two sample t-test. It compares the sample means of the groups. ANOVA shows us whether the scores (a score in this context is a z-score, which is a cardinal value of the deviation of the sample value from the mean of each group, in terms of the standard deviation) of independent groups vary significantly (statistically) across these groups.

In the context of this study, it helps to compare perceptions, as shown by the data, of the four principal groups in a construction project, i.e. civil engineers, project engineers, architects and site managers, with respect to the construction-issues that are raised with them (Bryman & Cramer 2001; Abusalama,2008).

However, a disadvantage of ANOVA is that it does not show us whether the construction engineering groups are significantly different from each other in their views of site management problems, training needs indicators or barriers to and methods of conducting TNA. This drawback can be overcome by using Tukey's Post-Hoc multiple comparisons procedure. This procedure shows whether there is any significant difference between each pair of groups in all the parametric variables.

3.9.3 Non-Parametric Tests

These are tests that require fewer assumptions to be made about the shape of the underlying distribution (Bryman & Cramer, 2001). Thus the name, distribution-free test applies to these tests (Abusalama, 2008; Bryman & Cramer, 2001; Siegel & Castellan, 1988). In this study the need for this type of test applies to all the relevant random continuous variables. This would intuitively exclude employees' personal and other non-relevant company information.

3.9.3.1 Kruskal-Wallis H test and Chi-Square

Given that there are four different construction engineering groups, the significant difference between these groups in TNA methods collection, criteria and techniques is tested using both Chi-Square and the Kruskal-Wallis H test. Chi-square is *a 'statistical test used to assess differences between groups using nominal or ordinal results'* (Hair *et al*., 2003), while, the Kruskal-Wallis H test '*is a non parametric statistical test used to assess the difference between groups using interval or ratio scales'* (Bryman & Cramer, 2001: p. 134). The main reason for using these tests is based on consideration of the criteria for choosing the appropriate statistical techniques described in the following paragraphs. In deciding which test to use and determining whether a difference between two or more groups is significant, the literature offers a relatively large number of statistical tests (Hair *et al*., 2003; Sekaran, 2003; Bryman & Cramer, 2001).

Finally, part of this study uses hypothesis testing for analysing data from construction organizations in Iraq. Independent sample t-tests (Sekaran 2003) are used to explore the differences between two groups, such as construction engineering groups. They are used because there is a need to compare the mean scores of some continuous variables between the views of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers. The null hypothesis is used in this study to determine relationships between variables, and therefore, whether variables are not different in terms of opinion. On the other hand, alternative hypotheses are used to determine whether variables are different. As a result, it is possible to determine whether the sentiments expressed are different or unequal, so that alternative conclusions can also be drawn from the initial opinions expressed. Each of the research hypotheses developed is tested by independent t-test analysis. Differences between the variables being assessed, in terms of their results, are determined from the p-value, and if it is found to be < 0.05, then the two variables do not differ significantly in terms of opinion (Price, 2009).

3.10 Validation and Measuring Reliability

3.10.1 Reliability

According to Brink (2007) reliability is concerned with establishing the degree to which a particular measurement is free of random or unstable error. Reliability in this study is measured using the internal consistency method by finding Cronbach's alpha (Sekaran, 2003; Cooper & Schindler, 2001). There are a number of devices for checking reliability in scales and tests, such as test-retest; which is the administration of the same test a period of time after the first. In this study, due to the time shortage and administrative limitations of firms, the test re-test method could not be performed to assess reliability, thus internal consistency was assessed using Cronbach's alpha, which can be written as a function of the number of test variables and the average inter-correlation between the variables (Abdulla, 2010). The formula for the standardized Cronbach's alpha can be shown as:

$$\alpha = \frac{N.\bar{c}}{\bar{v} + (N-1)\bar{c}}$$

Where N is equal to the number of variables, c-bar is the average inter-item covariance among the variables, and v-bar equals the average variance (Ahmed, 2010). In order to find internal consistency reliability, an item analysis is performed on each item and a Cronbach's alpha designed (Miller 1995). According to Akhtar (2009), cited in Nunnally (1967), values of alpha ranging from á = 0.50 to 0.60 are regarded as satisfactory for descriptive studies. Cronbach's values for all other constructs are relatively high. Hereafter, the values of Cronbach's alpha in this study indicate that the scales used in the instrument are adequate and suitable. When collecting questionnaires, attempts were made to ascertain that it was the respondents who had completed them by having an informal conversation where possible. The way in which the questionnaire was distributed facilitated the avoidance of errors resulting from ambiguity. The more consistently the subject responds, the greater the variability between the subjects in the sample and the higher the Cronbach's alpha value will be. The widely accepted cut-off in the social sciences is an alpha value of 70 or higher, which will give a standard error of the measurement of over half; meaning a standard deviation of 0.55 (Allen, 2002; Brink, 2007).

3.10.2 Validity

Validity is the extent to which research findings accurately represent what is really happening in a given situation (Hussey & Hussey, 1997). That is, when we develop an instrument for tapping into a concept, how can we be reasonably sure that we are measuring the concept we set out to and not something else (Sekaran, 2003). Validity refers to the extent to which a test measures what we actually wish to measure. Validity is undermined by research errors, such as faulty research procedures, poor samples, inaccurate or misleading measurements and ambiguity about causal direction (Hussey & Hussey, 1997; Saunders *et al*., 2003). Therefore, to meet the criteria for validity, the researcher should develop an accurate measurement tool that better reflects understanding of the questions included in the measurement tool; this guarantees that all respondents are enlightened to respond to all questions. In other words, the instrument of measurement should be understandable by all respondents to be certain that findings are really about what they appear to be about. In this study, to ensure high validity and to increase the validity of the two data collection methods, the following procedures were undertaken.

- To ensure external validity, the entire population was targeted as the sample for this study, with high response rates of 86% and 68% for the questionnaires and semi-structured interviews, respectively.

- To meet some of the validity requirements, an extensive literature review was undertaken to define and clarify the scales and measures used in this research. Many items and scales used are adopted from several studies that place an emphasis on meeting the requirements of validity and reliability. In this respect Sekaran (2003) asserted the need to use well-validated and reliable measures to ensure that research is scientific. Sekaran (2003) also high-lighted the importance of making use of measures and scales that are already developed, as their reliability and validity have been established by their developers and they are already reputed to be good. In addition, the items in the questionnaires were scrutinized and pre-tested, using several pilot testing stages, by many academic and experts and managers to judge the content and face validity of the questionnaires. This suggests that the validity of the content of the questionnaires is established.

- This research uses both strategies to test content validity (face validity) by, firstly, asking five experts in the field of construction to provide their judgments on the questionnaire, especially on the items in each set (concept), to check whether individual items correspond with the concept. Some minor revisions were made to the instrument according to their suggestions. Secondly, the instrument was pre-tested twice with a sub-population and a group of PhD students and one pilot study was tested on a group of similar subjects to the population. From this, extensive information and some constructive and encouraging comments on the questionnaire's design and content that would help in validating the content of the questionnaire were obtained.

3.11 Summary

This chapter introduced the methodology applied to meet the research aim and objectives of the study. A clear difference has been made between research methodology and research methods. Drawing on the epistemological, ontological and axiological assumptions, positivism was chosen as the appropriate paradigm. A review of the research methods revealed that survey was the most appropriate approach for eliciting the relevant data. Subsequently the design of the survey instrument was described following which a commentary was also provided on piloting of the questionnaires. This thesis adopts a positivist philosophy and two stages of inquiry. Firstly, the inductive modelling of the pressure/operational response model of TNA in the Iraq construction industry , based on the literature review and basic content scanning of a series of published 'snapshots' of TNA practices in a range of organizations. This inductive model is then tested deductively using opinion research, via the administration of a survey. This chapter describes the research methodology that was adopted and 'triangulates' research strategies as a means for achieving the main aims and specific objectives of the research. The research methodology adopts well established research approaches and is divided into five main sections: literature review, survey study, model development and implementation of the model, and evaluation of the model with feedback. The next chapter will examine the current training needs assessment within Iraqi construction industry. The work was carried out in the form of a survey, in order to get a real feel for the theoretical material which has been examined in this chapter. This study is using Hypothesis test for data analysis of construction organisations in Iraq.

Independent sample t-tests (Sekaran 2003) were used to explore the differences between two groups such as constructions engineers groups. They are used because this study needs to compare the mean score on some continuous variables between the view of the four principal actors in a construction project, i.e., civil Eng , Project Engineers , Architect and site manager for each variables. The null hypotheses are stated below;

Hypothesis 1*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training and non-training needs that should be used for setting training goals and organizational goals respectively. However, these goals should also provide basis for the future TNA.*

Hypothesis 2*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in providing information on training and non-training needs that should be used for employees' professional and personal development respectively.*

Hypothesis 3: *There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training and non-training needs that should be used for managing change in the organization.*

Hypothesis 4*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training needs that should be used for employees' career development.*

Hypothesis 5*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding TNA in identifying training needs that should be used for improving the trainees' level of knowledge and skills*

Hypothesis 6*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the importance of TNA in identifying training needs which help manage and increase the level of trainees' motivation to learn*.

Hypothesis 7*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project leader engineers, architects and site managers, regarding the importance of TNA in identifying training needs and therefore, by administering training only for the identified needs making it cost effective.*

Hypothesis 8*: There will be no significant difference in the perception of the four principal actors in a construction project, i.e. civil engineers, project engineers, architects and site managers, regarding the achievement of training effectiveness through proper TNA***.**

Chapter 4: Data Presentations And Descriptive Analysis

4.1 Introduction

In the previous chapters, a number of subjects relating to the choice of research methodology, research philosophy and paradigms adopted in this research have been discussed. This chapter analyses the data collected from the survey questions. Data analysis is a stage of analysing research questions and testing research hypotheses to enable the researcher to reach some conclusions. In this study, descriptive data analysis and deductive data analysis are discussed. In descriptive analysis, data has been carefully checked and summarized. In deductive analysis, data is tested for reliability against hypotheses. Frequency tables and charts give general information, such as the number and types of respondents, their age, years of experience, occupations and size of company. Using variance analysis (ANOVA) the results from respondents are compared by using post hoc tests of the groups, civil engineers, project leaders, architects and site managers, for each variable. Data are analysed, where possible, to show frequency, mean, standard deviation and variance as well as to compare views between groups and company sizes. Research hypotheses, arising from this study, are tested using independent tests to find out whether they can be accepted or rejected. The results are presented under the following headings.

4.2 Reliability Statistics

A test of the reliability of the questionnaire was carried out according to the pilot study. The reliability of an instrument is the degree of consistency which is attributed to the measures it is supposed to be measuring (Shaba, 2008**)**. Cronbach's alpha coefficient was calculated for each field of the questionnaire. The most similar values of alpha show not much difference in the means and variances of the original scales, and thus, standardization does not make a big difference to the value of alpha. Table 4-1 illustrates the values of Cronbach's alpha for each field of the questionnaire and the entire questionnaire. For the various fields, values of Cronbach's alpha ranged from 0.706 to 0.880; this range is high and good. The table below also shows that the value of Cronbach's alpha was 0.962 for the entire questionnaire, which indicates excellent reliability for the entire questionnaire. Hence, the evidence presented suggested that the questionnaire was valid, reliable, and ready for distribution among the population sample.

Table 4-1 Cronbach's alpha for each field of the questionnaire and the entire questionnaire

No.	Field	Cronbach's alpha
1	Construction site problems	0.869
2	Training needs indicators	0.834
3	Training needs barriers	0.815
4	TNA methods	0.757
5	Criteria of data collection Methods	0.758
6	TNA techniques	0.706
7	Importance of TNA	0.840
8	Skills needs	0.880
9	Skills possessed	0.829
10	Knowledge needs	0.870
11	Knowledge needs	0.849
	Total	**0.962**

A rule of thumb that applies to most situations is:

$0.9 \leq \alpha \leq 1.0$ Excellent

$0.8 \leq \alpha < 0.9$ Good

$0.7 \leq \alpha < 0.8$ Acceptable

$0.6 \leq \alpha < 0.7$ Questionable

$0.5 \leq \alpha < 0.6$ Poor

$0.0 \leq \alpha < 0.5$ Unacceptable

4.3 Ethical Considerations in this Study

According to Saunders *et al* (cited by Sutrisna, 2009: 56), *ethical issues in research, concern the relevance of the behaviour of the researcher in relation to the rights of the respondents*. It determines the level of credibility that a given research will be accorded, based on the research findings. To this end, the ethical issues highlighted by Leedy and Ormrod (2005: 101) and Mitchell and Jolley (2010: 52) guided the researcher throughout the duration of the study. Ethical issues such as informed consent, right to privacy and honesty were taken seriously. With this in mind, the researcher has attached a letter of consent for the respondents on the first page of the survey questionnaire. In return, the researcher will not reveal any names of institutions, individuals or companies that participated in the study. All the respondents' names, involved in this study have been changed to a code that is only known to the researcher and would not reveal the identity of any party involved in this study. According to a dictionary definition, to be ethical is to conform to accepted professional practices (Webster, 1968, cited in Bailey, 1987). In conforming to the established trend, the University of Salford has put in place a careful ethical validation procedure to assist researchers in conforming to a logically accepted standard. This code, designed by the University Salford is to ensure that:

- There is no interference with participants' physical and psychological well-being.
- The research procedure is not likely to be stressful or distressing.
- The research materials are not sensitive, discriminatory or inappropriate.
- The research design is sufficiently well-grounded so that the potential participants' time is not wasted during data collection.

4.4 Descriptive Analysis

The information used in this research is shown in the following tables.

4.4.1. Response Rate

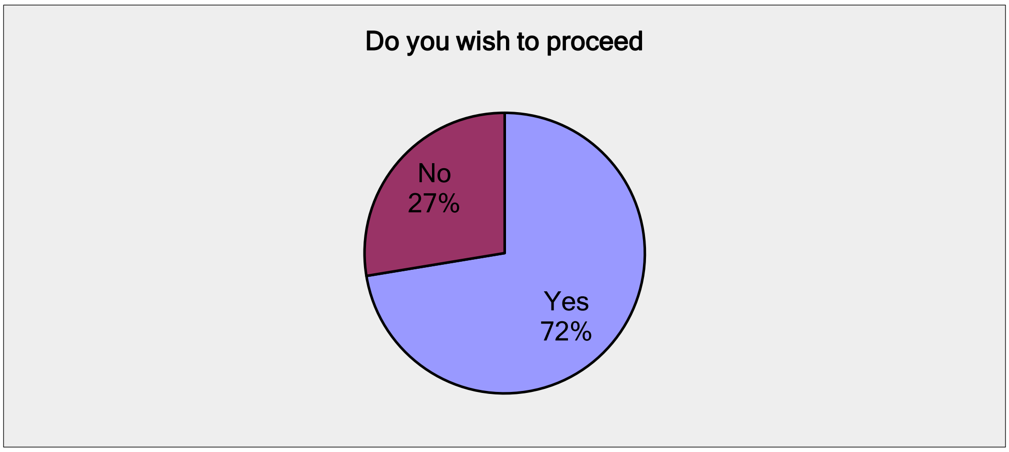
Out of a total of 330 questionnaires, there were 239 who participated and 91 who refused to participate in answering the survey. The frequencies of response are presented in Table 4-2 and indicate a population response rate of 72 .4 %; which is good.

Table 4-2 Do you wish to proceed?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Yes	239	72.4	72.4	72.4
	No	91	27.6	27.6	100.0
	Total	330	100.0	100.0	

A graphic representation of this table is shown in Figure 4-1.

.Figure 4-1: Do you wish to proceed?



4.4.2. Respondents' Ages

The majority (40.6%) of respondents were in the age range of 41 - 50 years, as illustrated in Table 4-3, with 31.0 % of respondents in the 31 – 40 years age range. Only 20.9 % of respondents were in the 25-30 years range, followed by the age ranges of 51 - 60 and 61 - 70. The question responses read as shown in Table 4-3.

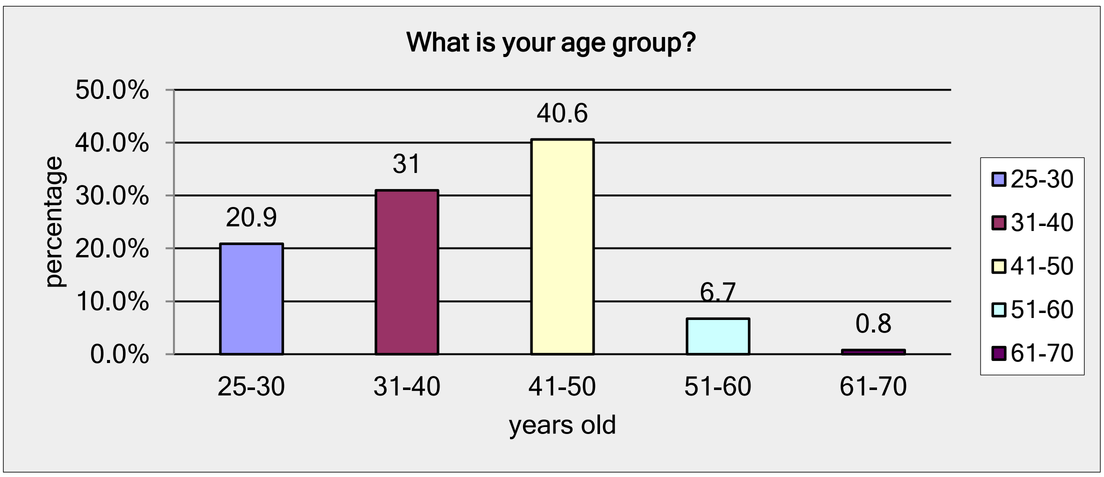
Table 4-3 Age groups

Age Groups						
Ages groups		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	25-30	50	15.2	20.9	20.9
	31-40	74	22.4	31.0	51.9
	41-50	97	29.4	40.6	92.5
	51-60	16	4.8	6.7	99.2
	61-70	2	.6	.8	100.0
	Total	239	72.4	100.0	
Missing	System	91	27.6		
Total		330	100.0		

This table is shown as a graphic representation in s.

Figure **4-2 Age group**s.

Figure 4-2 Age groups



4.4.3. Respondents' Experience in the Iraqi Construction Industry

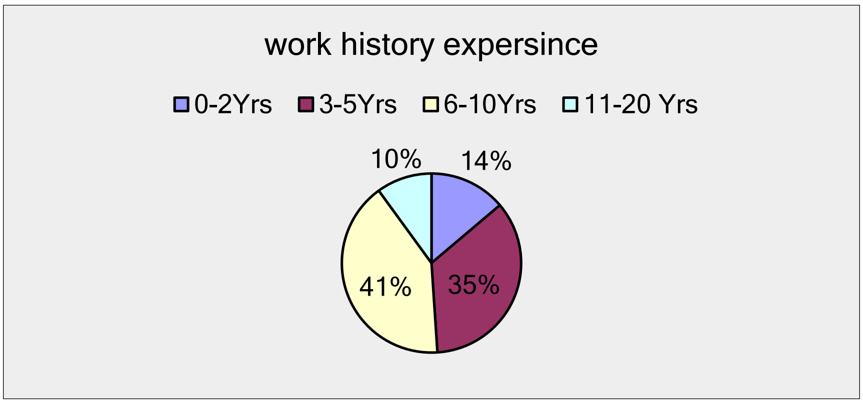
Respondents' experience in the construction industry was categorised in Table 4-4. Of the respondents, 33 had between 0 and 2 years' experience and constituted 13.8% of the total. Constituting 35%, 84 respondents had between 3 and 5 years' experience, with 98 respondents having between 6 and 10 years' experience and constituting 41.10%. Finally, 24 respondents had between 11 and 20 years' experience and constituted 10% of the total population. In order to determine the length of time that the respondents had been associated with their construction companies, the specific question: 'How many years have you worked in your company?' was asked.

Table 4-4 Work history

Year of experiences		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	0-2 Yrs.	33	10.0	13.8	13.8
	3-5 Yrs.	84	25.5	35.1	49.0
	6-10 Yrs.	98	29.7	41.0	90.0
	11-20 Yrs.	24	7.3	10.0	100.0
	Total	239	72.4	100.0	
Missing	System	91	27.6		
Total		330	100.0		

The data in this table are shown graphically in Figure 4-3. It can be seen that the majority of the respondents had between 6 and 10 years' experience and those with between 11 and 20 years' experience constituted the smallest group (10 %.).

Figure 4-3 Work history



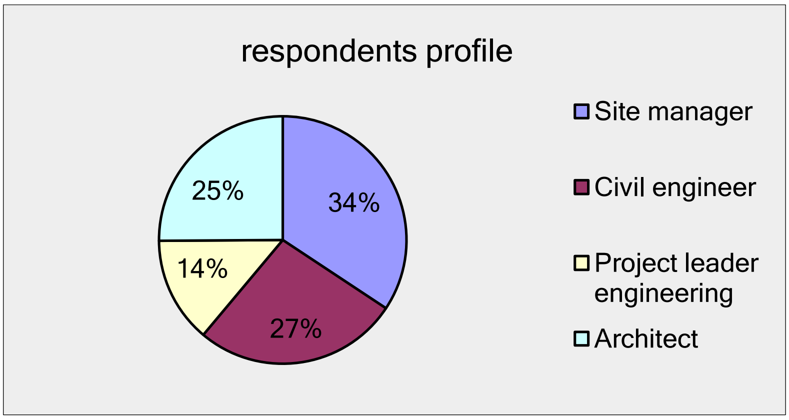
4.4.4 Respondents' Profiles

It is useful to identify the current jobs of individuals. From Table 4-5 it is obvious that the highest number of responses, 82, were from site managers, which are 34.3% of the total responses; project leaders were the group with the lowest response rate, 33 or 13.8%. Of the respondents, 64 were civil engineers, which correspond to 26.8%, with 60 of the respondents being architectural engineers, 6.25%. The low level of responses from project leaders may be due to their heavy commitments or concerns over confidentiality. These groups will be compared later, with respect to their mean scores on the dimensions, using frequency and a t-test for independent groups.

Table 4-5 Respondents' profiles

Respondents' Profiles					
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Site manager	82	24.8	34.3	34.3
	Civil engineer	64	19.4	26.8	61.1
	Project leader	33	10.0	13.8	74.9
	Architect	60	18.2	25.1	100.0
	Total	239	72.4	100.0	
Missing	System	91	27.6		
Total		330	100.0		

Figure 4-4: Respondents' profiles



4.4.5. Respondents by Organization Size

The respondents represent eight different organizations in the Iraqi construction industry. The type and size of these organizations can be broken down into the following categories, Table 4-6: small, medium and large enterprises. This is in agreement with findings in the literature, which suggest that the construction industry consists mostly of small, medium and large sized organizations. Respondents were asked to indicate the size of their company. Table 4-6 shows the highest response rate (42.1%) came from medium sized companies, the second highest response rate (31.3%) came from small sized companies and the lowest response rate (26.6%) was from large sized organizations. This could be due to the more secretive nature of larger organizations, making access to their managers more difficult. Responses to this question are presented in the table below.

Table 4-6 Company size

Company Size					
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Large company	62	18.8	26.6	26.6
	Medium company	98	29.7	42.1	68.7
	Small company	73	22.1	31.3	100.0
	Total	233	70.6	100.0	
Missing	System	97	29.4		
Total		330	100.0		

4.4.6 Frequency of Companies Conducting TNA

Four groups of practitioners in construction companies were asked if their company analysed employees' training needs. The results of the analyses showed that large companies give more attention to TNA than medium and small companies. Within large companies, according to respondents from large companies, TNA is conducted on an annual basis (53.2%), on an ad-hoc basis (35.5%), and every two years (11.3%). These figures show that large companies have an interest in conducting a TNA for their employees to keep their skills and knowledge up to date. For medium and small companies the picture is different. It can be seen that respondents from medium companies indicated that 55.1% conducted needs assessments on an ad hoc basis, 38.8 % conducted one annually, while 6.1% carried one out every two years. Of small companies, 56.2 % conducted a needs assessment on an ad-hoc basis, which represents the largest percentage, and 42.2% said they never conducted a need assessment. This could be due to many factors, such as lack of funding or lack of support from top management. It can be seen that TNA is not conducted often on a regular basis in Iraq.

Table 4-7 Frequency distribution for frequencies of TNA according to company size

Company size	Every 3 years	Every 2 years	Every one year	Ad-hoc	Never	Total
Large	0% 0	11.2% 7	53.2% 33	**35.48%** **22**	0%	62
Medium	0%	6 6.%	38 38.8%	**54** **55.1%**	0%	98
Small	0%	0%	0 0%	**56.1%** **41**	**42.4%** 31	73

4.4.7 Descriptive Data on Construction Site Management Problems

Descriptive statistics and statistical tests are necessary in order to make conclusive inferences. In this section the frequency distribution for each construction site management problem is a dependant variable. Table 4-8 provides some very useful descriptive statistics, including the means, standard deviations and 95% confidence intervals for the dependent variable for each separate group: site managers, civil engineers, project leaders and architects, as well as for all groups combined. From Figure 4-6 it can be seen that for all groups combined, management administration site problems are the most common problems on construction sites, and the least common is the shortage of skills and knowledge, according to responses from site managers, civil engineers, project leaders and architects. This is one of the major challenge (Management Admin site) identified in the literature. This demonstrates that management is common problem in Iraqi construction industry and, therefore training is required in this area.

Figure 4-6 Construction site management problems

Table 4-8 below shows descriptive data on problem areas in the management of construction sites. The means of each question and of all questions are greater than 3, in other words the frequency of the answers ‘Strongly Agree’ and ‘Agree’ was greater than ‘Strongly Disagree’ and ‘Disagree’.

Table 4-8: Descriptive statistics for construction site management problems

Descriptive Statistics for Construction Site Management Problems						
What is your position in your company?		**N**	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**
Site manager	Technical problems	81	3.5432	.61338	2.00	5.00
	Poor communication	82	4.7439	.43916	4.00	5.00
	Site Management Administration Problems	82	4.5000	.54997	3.00	5.00
	Shortage of skilled and knowledgeable workers	82	3.5000	.72436	2.00	5.00
Civil engineer	Technical problems	62	3.9531	.59368	3.00	5.00
	Poor communication	64	4.7744	.53429	3.00	5.00
	Management Site Administration Problems	64	4.5000	.65295	3.00	5.00
	Shortage of skilled and knowledgeable workers	64	4.1406	.83318	2.00	5.00
Project leader	Technical problems	33	3.3333	.59512	2.00	5.00
	Poor communication	33	4.4848	.56575	3.00	5.00
	Site Management Administration Problems	33	4.6970	.46669	4.00	5.00
	Shortage of skilled and knowledgeable workers	32	3.3750	.70711	2.00	5.00
				.		
Architect	Technical problems	58	4.2759	.61539	3.00	5.00
	Poor communication	60	4.3167	.59636	3.00	5.00
	Site Management Administration Problems	60	4.0000	.63779	2.00	5.00

	Shortage of skilled and knowledgeable workers	60	4.5667	.62073	3.00	5.00
				.		

In order to examine if the scores in all four groups were normally distributed, a One Sample Kolmogorov-Smirnov Test (KS-test) was carried out. The results of the One-Sample Kolmogorov-Smirnov Test for all four groups are listed in the appendix. Table 5 in appendix 5 illustrates that there were significant differences between scores for each variable in the groups. The P value for all groups was less than 0.05 (sig. for all groups = .0.000 > 0.05). It was concluded that the scores for each of the four groups of construction site management problem variables were normally distributed and so a One Way Parametric ANOVA Test for each variable between the groups was used.

4.4.8 Analysis of Variance for Construction Site Management Problems

In this section, an analysis to determine statistically significant differences between data groups: site managers, civil engineers, project leaders and architects, is presented. The Analysis of Variance (ANOVA) method is employed for this analysis (Bryman & Cramer,2012). As the data are grouped and searched by only one factor, one-way ANOVA between groups is used. The ANOVA tests for independent variables that showed significant differences between construction site management problems. In this test the mean for each question for each variable was compared to the mean for each group: site managers, civil engineers, project leaders and architects, to determine whether a significant difference existed.

The one-way ANOVA is an extension of the independent t-test in that it is a statistical method for studying relationships between sampled-data and focuses on the differences that appear between the means of the groups, but ANOVA enables relationships to be studied for more than two independent samples (Clarke & Cooke, 1998; Cohen, 1995). A one-way ANOVA was conducted for both questions and the results are displayed in Table 4-9 below.

Table 4-9: ANOVA of site management problems

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Technical problems	Between Groups	50.866	3	16.955	46.141	.000
	Within Groups	84.518	230	.367		
	Total	135.385	233			
Poor communication	Between Groups	6.683	3	2.228	8.074	.000
	Within Groups	64.832	235	.276		
	Total	71.515	238			
Site Management administration problems	Between Groups	21.102	3	7.034	20.078	.000
	Within Groups	82.329	235	.350		
	Total	103.431	238			
Shortage of skilled and knowledgeable workers	Between Groups	52.171	3	17.390	32.694	.000
	Within Groups	124.468	234	.532		
	Total	176.639	237			

Each variable for construction site management problems was analysed by ANOVA and the p values for each of the questions were lower than the acceptable threshold of 0.05. This indicates that the mean is significantly different among all groups, so we can conclude that the means of all groups are not equal. Post hoc multiple comparison testing was needed to establish exactly where the differences between groups were (see Table 2 in appendix 2). This test examined all group results for differences between means and all possible combinations of means. The Scheffe post-hoc test recognized that statistically significant differences were found between all engineering groups, except between the site managers and project leaders with respect to technical problems on construction sites. With respect to problems of poor communication, statistically significant differences were found between site managers and other groups: civil engineers, project leaders and architects. As for site management administration problems on construction sites, significant differences were found between all engineering groups except between site managers and project leaders. Finally, significant differences existed between all groups with respect to the problem of lack of skills and knowledge on construction sites, except between site managers and project leaders.

4.4.9 Descriptive Data for Training Needs Indicators

Table 4-10 shows the maximum and minimum means belonging to each of the groups, which is related to their variables (training needs indicators); the means for each of the groups for each question are greater than 3. This means that the frequency of the answers, 'Strongly Agree' and 'Agree', are greater than 'Strongly Disagree' and 'Disagree'. The career development mean for architects and civil engineers is less than 3, meaning the frequency of the answers 'Strongly Disagree' and 'Disagree' is higher than the frequency of the answers 'Strongly Agree' and 'Agree'. In order to examine if the scores in all four groups are normally distributed, a Kolmogorov-Smirnov Test (K.S) was carried out, (see appendix 6). The results of the One-Sample Kolmogorov-Smirnov Test are shown for all four groups listed in the appendix. Table 2 in the appendix illustrates that there are significant differences between scores in each of the variables in the group. The P value for all groups was less than 0.05 (significance is indicated by $P = .0.000 > 0.05$). It was concluded that the scores in each of the four groups of construction site management problem variables are normally distributed and so One Way Parametric ANOVA Tests were applied to each variable between groups.

Table 4-10 Training Needs Indicators

What is your position in your company?		N	Mean	Std. Deviation	Minimum	Maximum
Site manager	1- Development of employee skills to fill a current need	82	3.7073	.76154	2.00	5.00
	2- Career development	82	3.1341	.71599	2.00	5.00
	3- Organizational problems	82	4.7317	.44580	4.00	5.00
	4- Meet new changes in work environment	82	3.9268	.81317	2.00	5.00
Civil engineer	1- Development of employee skills to fill a current need	64	4.0000	.64242	2.00	5.00
	2- Career development	64	3.5469	.56145	2.00	5.00
	3- Organizational problems	64	4.5156	.53429	3.00	5.00
	4- Meet new changes in work environment	64	2.9219	.69704	2.00	5.00
Project leader	1- Development of employee skills to fill a current need	33	2.6970	.71244	3.00	5.00
	2- Career development	33	4.5152	.52944	2.00	4.00
	3- Organizational problems	33	3.8485	.66714	3.00	5.00
	4- Meet now Changes in work environment	33	4.8182	.39167	4.00	5.00
Architect	1- Development of employee skills to fill a current need	60	4.4000	.71781	2.00	5.00
	2- Career development	60	3.3167	.56723	2.00	5.00
	3- Organizational problems	60	4.2333	.67313	3.00	5.00
	4- Meet new changes in work environment	60	2.6833	.59636	2.00	4.00

4.4.10 Analysis of Variance for Training Needs Indicators

Table 4-11 shows the output of ANOVA analysis and any statistically significant differences between group means. The significance level is 0.000 (p = 0.000), which is below 0.05, therefore, there is a statistically significant difference in the means of each training needs indicator variable between all the groups.

Table 4-11 ANOVA for training needs indicators

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
1 - Development of employee skills to fill a current need	Between Groups	17.277	3	5.759	11.314	.000
	Within Groups	119.618	235	.509		
	Total	136.895	238			
2- Career development	Between Groups	17.006	3	5.669	14.912	.000
	Within Groups	89.337	235	.380		
	Total	106.343	238			
3- Organizational problems	Between Groups	8.608	3	2.869	8.983	.000
	Within Groups	75.058	235	.319		
	Total	83.665	238			
4-To meet new changes in work	Between Groups	133.452	3	44.484	94.980	.000

environment	Within Groups	110.063	235	.468		
	Total	243.515	238			

This is useful knowledge, but it does not tell us which of the groups differed, specifically. This can be determined from the Multiple Comparisons table which shows the results of post-hoc tests. The Scheffe post-hoc test was used, and responses to this question are presented in Table 3, appendix 3. For career development, significant differences were found between all groups except between site managers and architects. As for organizational problems, significant differences were found between architects and all other groups, and statistical differences were also found between site managers and civil engineering groups. Finally, significant differences were found between all groups, except for civil engineers and architects with respect to new changes in the working environment. It is obvious that differences between the means of all groups occurred mostly in career development and change in work environment variables, as shown in appendix 3. All pairs of group results were tested for differences between means as well as all the possible combinations of means. The Scheffe post-hoc test showed that statistically significant differences existed between groups with respect to the training indicator: development of employee skills to fill a current need. There were differences between architects and all others groups and also between site managers and civil engineers. However, there was no statistical difference between site managers and project leaders and also between project leaders and civil engineers. For career development, significant differences were found between all groups except between site managers and architects. As for organizational problems, significant differences were found between architects and all other groups, and statistical differences were also found between site managers and civil engineering groups. Finally, significant differences were found between all groups, except for civil engineers and architects with respect to new changes in the working environment. It is obvious that differences between the means of all groups occurred mostly in career development and change in work environment variables, as shown in appendix 3.

4.4.11 Descriptive Data on Barriers to Training Needs

Table 4-12 shows the maximum and minimum mean for each variable (barriers to training needs). The mean for each group for each question is greater than 3. This means that the frequency of the answers ‘Strongly Agree’ and ‘Agree’ was higher than the frequency of the answers ‘Strongly Disagree’ and ‘Disagree’. However, the mean for the variable: lack of new workers interested in a skills development programme, was less than 3, which means that the frequency of the answers ‘Strongly Agree’ and ‘Agree’ was lower than that of the answers ‘Strongly Disagree’ and ‘Disagree’.

Table 4-12: Descriptive Statistics on Barriers to Training Needs

What is your position in your company?		N	Mean	Std. Deviation	Minimum	Maximum
Site manager	1-Lack of financial resources;	82	3.8049	.79254	2.00	5.00
	2-Lack of adequate expertise	82	4.4146	.64695	3.00	5.00
	3-Lack of job descriptions	82	4.6707	.58910	2.00	5.00
	4-Unsystematic training approaches	82	4.1829	.83338	2.00	5.00
	5-Lack of support from top management	82	4.4146	.66576	3.00	5.00
	6-Lack of new workers interested in skills development programmes;	82	2.7317	.75439	1.00	4.00
	7-Once trained, employees leave our organization	82	3.3049	.76480	2.00	5.00
Civil engineer	1-Lack of financial	64	4.2813	.78617	3.00	5.00

	resources;					
	2-Lack of adequate expertise	64	4.2812	.67774	2.00	5.00
	3-Lack of job descriptions	64	4.5625	.55990	3.00	5.00
	4-Unsystematic training approaches	64	3.5156	.66648	2.00	5.00
	5-Lack of support from top management	64	4.7813	.48693	3.00	5.00
	6-Lack of new workers interested in skills development programmes;	64	2.7969	.67093	2.00	4.00
	7-Once trained, employees leave our organization	64	3.1875	.70991	2.00	5.00
Project leader engineering	1-Lack of financial resources;	33	3.8182	.72692	3.00	5.00
	2-Lack of adequate expertise	33	4.5152	.56575	3.00	5.00
	3-Lack of job descriptions	33	4.3333	.77728	2.00	5.00
	4-Unsystematic training approaches	33	3.4848	.75503	2.00	5.00
	5-Lack of support from top management	33	4.1212	.64988	3.00	5.00
	6-Lack of new workers interested in skills development programmes;	33	2.8788	.73983	2.00	4.00
	7-Waste of time and money	33	4.1818	1.07397	2.00	5.00
Architect	1-Lack of financial resources;	60	4.1333	.74712	3.00	5.00
	2-Lack of adequate expertise	60	4.5000	.56748	3.00	5.00
	3-Lack of job descriptions	60	4.4333	.69786	2.00	5.00
	4-Unsystematic training approaches	60	3.5333	.85304	2.00	5.00
	5-Lack of support from top management	60	4.6667	.57244	3.00	5.00
	6-Lack of new workers interested in skills	60	2.8333	.66808	2.00	4.00

	development programmes;					
	7-Once trained, employees leave our organization	60	3.1667	.84706	2.00	5.00

In order to examine if the scores in all four groups were normally distributed, a Kolmogorov-Smirnov Test (K.S) was carried out. The Results of the One-Sample Kolmogorov-Smirnov Test is shown for all four groups listed, in the appendix. Table 7 in the appendix 7 illustrates that there were significant differences among scores of each of the variables in the groups. The P value for all groups was less than 0.05 (significant when P= 0.000 > 0.05). It was concluded that the scores for each of the four groups of construction site management problem variables were normally distributed and so One Way Parametric ANOVA Tests for each variable between groups were used.

4.4.12 Analysis of Variance for Barriers to TNA

Table 4-13 shows that overall there were significant differences in the TNA between all groups. However, in the cases of lack of adequate expertise and lack of employees' interest in a skills development programme, the P value exceeded 0.5; therefore, there were no significant differences between these four groups. On the other hand, for the rest of variables, there were significant differences between the four groups.

Although this is useful knowledge, which of the specific groups differed has not been identified. A Multiple Comparisons table contains the results of post-hoc tests, and can be used to determine this. Although the ANOVA indicated that significant differences existed, post hoc multiple comparison testing was needed to establish exactly which pairs of groups differed from each other. With a lack of financial resources as a barrier to training needs there were statistically significance differences found between all groups, except between site managers and project leaders. For a lack of adequate expertise, no statistical differences were found between groups. Significant statistical differences were found only between site managers and all other groups with respect to lack of job descriptions. As for unsystematic training approaches, no significant differences were found between civil engineers, project leaders and architects, but they were found between site managers and all other groups. Significant differences, with respect to lack of support from top management, were found between all groups apart from civil engineers and architects. No differences were found between groups with respect to lack of new workers interested in skills development programmes, and finally for wasting time, significant differences were found between project leaders and all other groups, as shown in appendix 4. It is obvious that mean differences between all groups occurred mostly in the areas of lack of management support and unsystematic training approaches.

Table 4-13 ANOVA for barriers to training needs

		Sum of Squares	df	Mean Square	F	Sig.
1-Lack of financial resources;	Between Groups	10.275	3	3.425	5.763	.001
	Within Groups	139.658	235	.594		
	Total	149.933	238			
2-Lack of adequate expertise	Between Groups	1.909	3	.636	1.624	.184
	Within Groups	92.082	235	.392		
	Total	93.992	238			
3-Lack of job descriptions	Between Groups	3.521	3	1.174	2.875	.037
	Within Groups	95.926	235	.408		
	Total	99.448	238			
4-Unsystematic training approaches	Between Groups	24.015	3	8.005	12.936	.000
	Within Groups	145.416	235	.619		
	Total	169.431	238			
5-Lack of support from top management	Between Groups	11.759	3	3.920	11.007	.000
	Within Groups	83.688	235	.356		
	Total	95.448	238			
6-Lack of new workers interested in skills development programmes	Between Groups	.649	3	.216	.429	.732
	Within Groups	118.305	235	.503		
	Total	118.954	238			

7-Once trained, employees leave our organization	Between Groups	26.684	3	8.895	13.198	.000
	Within Groups	158.370	235	.674		
	Total	185.054	238			

4.4.13 Approaches to Determining T&D Needs

Practitioners were asked for eight methods used to identify their T&D needs. Results showed that all groups of construction engineers in this study have selected performance appraisal as the preferred method for collecting TNA data (Mean 4.25). This method is known as the best method for most companies and could be attributed to that fact that this method helps them to indicate strengths and weakness in skills, identify training and development needs and can also help indicate candidates for merit, raises or promotions. The second method selected as preferred for collecting TNA data is site visit observation with a mean of 3.76. This could be due to the reason that this method generates real-life data for companies. Then third method was questionnaires with a mean of 3.65. For the rest of the methods we see less interest in their use for collecting TNA Data, as shown in Table 4-13 below.

Table 4-14: TNA Data Collection Methods and Analysis of Differences.

Data collection methods of TNA	N	R	S	R	A	Mean
1- **Performance appraisal**	0%	5.5%	24..5%	50%	20.%	**4.25**
2- **On-site observations**	12.5%	10%	38. %	22%	18.5%	**3.76**
3- **Questionnaires**	5%	15%	50%	17.5%	12.5%	3.65
4- **Focus groups**	15%	25%	30.%	25.5%	5%	3.17
5- **Delphi method**	12%	22%	58%	5%	0%	3.14
6- **Assessment centres**	10%	40%	50%	0%	0%	2.80
7- **Document reviews / examinations**	30.5%	.49%	20.5%	0%	0%	2.59

8- Advisory committees	35.7%	40.3%	18%	0%	0%	2.28

Referring to Table 4-14 and comparing the employees who preferred the best methods for collecting TNA data, no significant differences were found between the top two methods: namely performance appraisal (0.819) and observations from on-site visits (0.15). For the remaining methods, a training needs methods unit did not make any difference to the application of these methods.

Table 4-15: Test statistics (Kruskal Wallis Test Grouping)

Data Collection Methods	Test Statistics (Kruskal Wallis Test Grouping Variable: Construction Eng.).		
	Chi-Square	df	Asymp. Sig
Performance appraisal forms	2.916	4	**.819**
On-site observations	9.233	4	**.015**
Questionnaire surveys	16.312	4	.001
Focus groups	3.857	4	.000
Delphi method	1.6865	4	.000
Assessment centres	2.5651	4	.000
Document reviews / examinations	6.985	4	.001
Advisory committees	6.924	4	.003

4.4.14 Criteria for Choosing Data Collection Methods

If looking at the number of respondents who chose the option ‘very important’, the availability and expertise of HR staff from a TNA activity was regarded as the most important criteria for them in choosing data collection methods (40.%), followed by cost effectiveness (37.2%). However, if the response options ‘Very important’ and ‘important’ were combined, the criteria considered as being most important by most respondents was cost effectiveness (70%).

Table 4-16 Criteria considered in the selection of data collection methods

Desired outcomes	Not important	Somewhat important	Neutral	Important	Very important
Availability and expertise of HR staff	2%	4.5%	23.5%	29. %	**40.%**
Cost-effectiveness	6%	4.8%	20.2%	33.8%	37.2%
Top management preference	4.5%	25&	16%	34%	25.5
Time required	3%	27%	20.3%	26.5%	23.8%
Organizational culture and value	6.5%	25%	27.4%	22.6%	19.5%
Facilities available	8%	29.5%	30.5%	20%	12%

4.4.15 Determination of Level of Training Needs

The study measured the level of TNA undertaken in an organization prior to decisions made on training, based on the OTP model (McGhee & Thayer, 1961). Eerde *et al*. (2008) used this scale for measuring TNA comprehensiveness. We used the scale from the study by Jamil (2006) on Malaysian companies, using a 5-point Likert response scale ranging from '1 = Never' to '5 = Always', to assess the more frequent TNA techniques adopted by Iraqi construction companies at each of the three levels. A general observation was that the respondents perceived that their organizations were not paying attention to all levels of TNA; attention was only paid to an analysis of the organization level. Compared to other techniques used to analyse training needs at the organizational level, PEST analysis was the most widely used by the organizations: 11.3% always, 26% frequently and seldom 38 %. The second most popular method was organizational scan: 16.3% frequently and 3.8% seldom. Only 39% of those who responded said that their organization never adopted SWOT analysis techniques for assessing training needs. A total of 19 % of employees responded by saying that their organization was also not involved in conducting workforce TNA using PEST analysis techniques.

Construction organizations in Iraq are sometimes involved in preparing training programmes for their employees due to changes in the political and economic situation in Iraq, but this method is not so common. The majority of respondents using this technique actually came from large companies, as large organizations have enough resources in terms of finance and human assets to support them in conducting comprehensives workforce TNA prior to training programmes. It appeared that respondents from all companies perceived that their organization was not paying much attention to all levels of analysis. The figures in 6 provide an explanation for this in that no single organization in the private or public sector used organizational analysis techniques frequently or always. More surprisingly, it appeared that construction organizations in Iraq did not pay attention to the three levels of TNA or to comprehensive TNA practices prior to conducting training programmes, despite this being recommended for better training outcomes.

Table 4-17: Training Needs Techniques

(N = never, R = rarely, S= seldom, F = frequently, A = always)

Technique **Organization analysis**	**Frequency of response**						
	N (%)	**R (%)**	**S (%)**	**F (%)**	**A (%)**	**Mean**	**Rank**
PEST analysis	19.7% (47)	30.1% (72)	**38.9% (93)**	26.0% (59)	11.3% (27)	2.42	1

Organizational scanning	31.4% (75)	**48.5% (116)**	16.3% (39)	3.8% (9)	0.0% (0	1.92	2
SWOT analysis	39.3% (94)	**48.1% (115)**	10.9% (26)	1.7% (4)	0.0% (0)	1.75	3
Balanced scorecard	**47.3% (113)**	44.8% (107)	7.5% (18)	0.4% (1)	0.0% (0)	1.61	4

Technique **Task analysis**	**Frequency of response**						
	N (%)	**R (%)**	**S (%)**	**F (%)**	**A (%)**	**Mean**	**Rank**
Job Analysis	33.1% (79)	**47.3% (113)**	16.3% (39)	3.3% (8)	0.0% (0)	1.90	1
Competency analysis	**59.8% (143)**	29.3% (70)	11.0% (26)	0.0% (0)	0.0% (0)	1.52	2
Managerial skills audit	**80.8% (193)**	13.4% (32)	5.4% (13)	0.0% (0)	0.% (0)	1.26	3
Skills inventory	**84.5% (202)**	12.6% (30)	2.9% (7)	0.0% (0)	0.0% (0)	1.18	4

Technique **Individual analysis**	**Frequency of response**						
	N (%)	**R (%)**	**S (%)**	**F (%)**	**A (%)**	**Mean**	**Rank**
Performance review	**48.1% (115)**	43.9% (105)	7.5% (19)	0.% (0)	0.0% (0)	1.60	1
Repertory Grid Analysis	**82.0% (196)**	16.7% (40)	1.3% (3)	0.0% (0)	0.0% (0)	1.19	2

Versatility chart / analysis	**90.8% (217)**	9.2% (22)	0.0% (0)	0.0% (0)	0.0% (0)	1.09	3
Diary Analysis	**92.9% (222)**	7.1% (17)	0.0% (0)	0.0% (0)	0.0% (0)	1.07	4

4.5 The Outcomes of TNA and Hypothesis Testing

4.5.1 Training Effectiveness Improvement

Table 4-18 shows 'strong agreement' or 'agreement' (72%) that TNA plays an important role in making training outcomes more effective; only 3% were neutral with respect to the statement. The mean of the table (4.71) also supports the statement.

Table 4-18 TNA play an important role in ensuring effective training

Level of agreement		Frequency	Percentage	Mean	p-value
Valid	3-Neutral	1	.3	4.71	0.923
	4-Agree	110	33.3		
	5-Strongly agree	128	38.8		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

The first hypothesis was tested using the independent t-test; p was 0.923. No significant difference existed between all four constructions groups in terms of their opinions on training effectiveness being achieved through effective TNA. The null-hypothesis of independence was not rejected and is listed in appendix 8. Therefore, the alternative hypothesis would not be accepted either, where there is a difference of opinion between the four principal actors.

4.5.2 Organizational Goals Achievement

Table 4-18 indicates that most participants (67%) generally agreed that TNA helps to achieve organizational goals; with 4% neutral with respect to the statement. The mean of the table (4.22) also supports the statement.

Table 4-19 Training helps to achieve organizational goals if it is based on TNA of construction employees

Level of agreement		Frequency	Percentage	Mean	p-value
Valid	3-Neutral	15	4.5	4.22	175
	4-Agree	155	47.0		
	5-Strongly agree	69	20.9		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

The Second Hypothesis was tested using an independent t-test; p was 0.175 which is greater than 0.05, as listed in appendix 8. Therefore, no significant difference was found between all groups in terms of their opinions. The null-hypothesis of independence was not rejected, as indicated, there seems to be a small difference.

4.5.3 Cost reduction

Table 4-20 shows that most participants in the survey (66%) agreed that TNA helps to reduce the cost of training programmes; 5% were neutral with respect to the statement. The mean of the table (4.30) also supported the statement.

Table 4-20 Cost reduction

		Frequency	Percentage	Mean	p-value
Valid	3-Neutral	19	5.8	4.30	608
	4-Agree	129	39.1		
	5-Strongly agree	91	27.6		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

There was no significant difference between groups with respect to the **Third Hypothesis**, as the P value was 0.608, (see the appendix 8).which is greater than 0.05 hence, there was no significant difference in the distribution of values between groups. Therefore, in this case, the alternative is rejected and the null-hypothesis accepted - that there are no statistically significant differences between the means of the groups.

4.5.4 Managing Change

Table 4-21 shows a neutral response from most participants (38.5 %) with respect to TNA helping to manage any changes; with 24.2% in general agreement. Finally, 9.7 % said they did not support the statements. The mean of the table (3.21) also supports the statement.

Table 4-21 TNA helps to manage change in your company

		Frequency	Percentage	Mean	P-value
Valid	2-Disagree	32	9.7	3.21	006
	3-Neutral	127	38.5		
	4-Agree	76	23.0		
	5-Strongly agree	4	1.2		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

The fourth hypothesis was independently tested, as listed in appendix 8; p was 0.006, which is less than 0.05 hence, there was a significant difference in the distribution of values between all groups .Therefore, the null-hypothesis of indifference was rejected and the alternative hypothesis accepted: that there is a difference in opinion between the four principal actors.

4.5.5 Professional Development of the Workforce

Table 4-22 shows that all groups (34%) were in general agreement over a neutral response, 35.2% felt that TNA is very important in providing information on training and non-training needs and can be used for employees' professional and personal development. However, 3.3% of respondents did not support the statement. The mean of the table (3.52) also supports the statement.

Table 4-22 Workforce Professional Development

		Frequency	Percentage	Mean	P-Value
Valid	2-Disagree	11	3.3	3.52	0.62
	3-Neutral	116	35.2		
	4-Agree	88	26.7		
	5-Strongly agree	24	7.3		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

An independent-samples t-test was run for the **fifth hypothesis** to determine if there were differences between groups in the importance of TNA for encouraging a workforce's professional development. The results of the independent-t-test showed no significant difference between groups (95% CI, -.38479 to .00931, t (237) = -1.877 p = .062), and are listed in appendix 8. Therefore, in this case, the alternative is rejected and the null-hypothesis accepted - that there are no statistically significant differences between the means of the groups.

4.5.6 Career Development

Table 4-23 shows that all groups (41%) generally agreed that TNA is very important for career development with a neutral response from 26 .4 % of respondents. However, 4.3% of respondents did not support the statement. The mean of the table (3.83) supports the statement.

Table 4-23 TNA for Career Development

		Frequency	Percentage	Mean	P-Value
Valid	2-Disagree	14	4.2	3.83	0.000
	3-Neutral	87	26.4		
	4-Agree	63	19.1		
	5-Strongly agree	75	22.7		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

A t-test was run on independent-samples to test the **sixth hypothesis,** to determine if there were differences in the perceptions of the importance of TNA to career development between groups. The results of the independent- t-test showed statistically significant differences between groups (0.000 95% CI, -1.19913 to 75846, t (217.286) = -9.748, p = 0.000). Therefore, in this case, the alternative hypothesis was not accepted and the null-hypothesis was accepted; there are statistically significant differences between the means of the groups.

4.5.7 Trainees' Motivation to Learn

Table 4-24 shows general agreement between all groups (43%), that TNA helps to increase trainees' motivation to learn, with a neutral response from 26.7%. However, 2.7% of respondents did not support the statement. The mean of the table (3.85) also supports the statement.

Table 4-24 Trainees' Motivation to Learn

		Frequency	Percentage	Mean	P-value
Valid	2-Disagree	9	2.7	3.85	0.000
	3-Neutral	88	26.7		
	4-Agree	70	21.2		
	5-Strongly agree	72	21.8		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

An independent-samples t-Test, listed in appendix 8, was run to establish whether the **seventh hypothesis** was true; to determine if there were differences in opinion of the importance of TNA in identifying training needs, which could help manage an increase in trainees' motivation to learn. The results of the independent-t-test showed statistically significant differences between groups (0.000 (95% CI, .885701 to 28021), t (216.563) = 12.029, p = 0.000). Therefore, in this case, the alternative hypothesis was not accepted and the null-hypothesis accepted; that there were statistically significant differences between the means of groups was not accepted.

4.5.8 Knowledge and Skills Improvement

Table 4-25 indicates that there was general agreement between all groups (53%), and a neutral response from 17 .3 % of respondents, that TNA helps to improve the level of knowledge and skills. However, 9 0% of respondents did not support the statement. The mean of the table (4.14) also supports the statement.

Table 4-25 Knowledge, Skills and Attitude

		Frequency	Percentage	Mean	P. Value
Valid	2-Disagree	3	.9	4.14	0.00
	3-Neutral	57	17.3		
	4-Agree	82	24.8		
	5-Strongly agree	97	29.4		
	Total	239	72.4		
Missing	System	91	27.6		
Total		330	100.0		

An independent-samples t-test was run, in appendix 8, for the **eighth hypothesis** to determine if there were differences of opinion with respect to the importance of TNA for increasing knowledge and skills. The results of the independent-t-test indicated that there was statistically significant difference between groups (0.000 (95% CI, .885701 to 28021), t (214.040) =, 10.728 p = 0.000). Therefore, in this case, the null-hypothesis was accepted and the alternative hypothesis cannot be accepted; that there are statistically significant differences between the means of the groups.

4.6 TNA to Improve the Maintenance of Engineering Skills and Knowledge

An analysis of the skills and knowledge needed by construction engineers for their present jobs at the aggregate level was carried out. This will be followed by an evaluation of the importance of skills and knowledge by the four groups: site managers, project leaders, civil and architectural engineers.

The tables below show that the calculated training needs gap is not just based on the skills and knowledge possessed by employees. It has two dimensions: firstly, the importance of a particular skill and/or knowledge for successful performance of the job and, secondly, the extent to which the employee possesses that skill and/or knowledge. Certain skills and knowledge are more important than others; hence, if the employee does not have these, then the training needs gap will be greater. If the skills and knowledge are less important and the employee does not have them, then the training needs gap will be smaller. The respondents were asked to rate the importance of skills and knowledge and the extent to which they have that skill and/or knowledge. Skills and knowledge are reported here by majority frequencies (‘Not important', ‘Somewhat important’, ‘Not sure’, ‘Important’ and 'Very important'; ‘Poor’, ‘Fair’, ‘Average’, ‘Good’ and ‘Excellent’), which were combined to determine the skills and knowledge that construction engineers perceive to be most important for their jobs. Majority frequencies were established by analysing each skill/knowledge item, from whether a majority of the sample population found this skill/knowledge item to be important and the extent to which they possessed it for their current job. If they did, then for each skill/knowledge item, the category which recorded the highest frequency was chosen and presented in the tables below. Based on this, the training needs gap for different skills and knowledge was calculated and mean scores presented below (Egbu, 1994**).**

Table 4-26 Mean scores of the training needs gap for different skills and the independent sample t-test of the importance of skills needs

Skills types	Frequency response of rate of the importance of skills							Training need gap mean score	
	1	2	3	4	5	T. test	P	M	R
Project management skills	**0**	**0**	**0**	**21.8%**	**78.2%**	**-.936**	**.350**	**4.78**	**1**
Technical skills	**0%**	**0%**	**2.5%**	**40.6%**	**56.9%**	**-1.680**	**095**	**4.54**	**2**
Interpersonal Skills	**0.0%**	**0.0%**	**16.7%**	**49.8%**	**33.5%**	**-1.042**	**.298**	**4.17**	**3**
Enterprise skills	**0%**	**0%**	**27.6%**	**54.8%**	**17.6%**	**3.732**	**.000**	**3.90**	**4**
Conceptual skills	**0.0%**	**2.1%**	**38.9%**	**54.0%**	**5.0%**	**3.814**	**.000**	**3.62**	**5**
Business skills	**0.0%**	**5.4%**	**57.3%**	**33.9%**	**3.3%**	**4.036**	**.000**	**3.35**	**6**

1- not important; 2- somewhat important; 3- not sure; 4- important; 5- very important

To what extent do engineering groups have these skills?

Skills type	Frequency of responses of the extent to which they have these skills.							Training need gap mean score	
	1	2	3	4	5	T. test	P	M	R
Project management	56.9%	41.4%	1.3%	0%	.4%	-.621	535	**1.46**	**1**
Interpersonal Skills	10.9%	66.1%	22.2%	.8%	0%	-1.432	142	**2.13**	**2**

Enterprise skills	12.1%	56.5%	30.1%	.8%	4%	-8.963	.000	**2.21**	**3**
Technical skills	20.5%	32.6%	25.9%	20.5%	4%	12.542	.000	**2.48**	**4**
Conceptual skills	20%	25.5%	65.3%	4.2%	0%	-6.592	000	**2.69**	**5**
Business skills	3.3%	20.9%	49.0%	25.1%	1.7%	-6.443	.000	**3.01**	**6**

(1 - Poor 2 - Fair 3 - Average 4 - Good 5 - Excellent)

From Table 4-26 it can be seen that the most important skills with the highest mean scores, are project management (very important 78%; important 21%; mean 4.78), followed by technical skills (very important 56%; important 40%; mean 4.54). Conversely, it also shows that the skills actually possessed by employees that scored lowest, was project management with a mean score of (poor 56%; fair 41%; mean 1.46), followed by interpersonal skills with a mean score of (poor 10%; fair 66%; mean 2.13). Therefore, the training needs gap was greatest in the area of project management skills followed by that of interpersonal skills. Table 4-27 indicates that the most important knowledge needed by construction employees was site management administration, (very important 77.2%; important 22.8 %; mean 4.78), followed by construction knowledge of process (very important 50%; important 45.5%; mean 4.54). However, data showed the knowledge least possessed was site management administration (poor 60%; fair 39.1%; mean 1.40), followed by knowledge production on site (poor 28%; fair 56%; mean 1.87). Therefore, the training needs gap is relatively larger in site management administration, followed by in construction knowledge production on site processes; these areas need more attention in terms of training. The training needs gap was smallest in the area of design knowledge, followed by that of quantity surveying.

Table 4-27 Mean scores of training needs gaps of different knowledge needs and the independent sample t-Test on the importance of knowledge needs

Knowledge type	**Frequency response of the importance of knowledge**							**Training needs gap mean score**	
	1	2	3	4	5	**T. test**	**P**	**M**	**R**
Site management,	0%	0%	0%	22.8%	77.2%	-.936	.350	**4.78**	

administration								
knowledge of process	0%	0%	4.5%	45.5%	50.%	1.680	.095	**4.54**
Knowledge Production on site	0	0	16%	52.8%	30.5%	1.042	.029	**4.17**
Construction technology	0%	0%	25.2%	54.7%	20.1%	3.732	.000	**3.90**
Quantity surveying	0.0%	2.1%	38.9%	54.0%	5.0%	3.814	.000	3.62
Design knowledge	0.0%	5.4%	57.3%	33.9%	3.3%	4.036	.000	**3.35**

1- not important; 2- somewhat important; 3- not sure; 4- important; 5- very important

Knowledge type	**Frequency response of the extent to which they have that knowledge (1 - Poor 2 - Fair 3 - Average 4 - Good 5 – Excellent)**					**T. test**	**P**	**Training needs gap mean score**	
	1	2	3	4	5			**M**	**R**
Site Management, administration	60.4%	39.1%	0.4%	0%	0%	-3.504	.001	**1.40**	**1**
Knowledge Production on-site	28.5%	56.2%	15.3%	0%	0%	-.144	.885	**1.87**	**2**
Construction technology	31.1%	26.0%	32.3%	10.6%	0.0%	8.840	.000	**2.23**	**3**
Construction knowledge process	8.5%	51.5%	37.4%	2.6%	0.0%	-2.794	.000	**2.34**	**4**
Design knowledge	11.1%	44.3%	30.2%	14.5%	0.0%	-2.794	006	**2.48**	**5**
Quantity surveying	3.4%	39.1%	40.2%	17.5%	0%	-6.752	.000	**2.71**	**6**

4.7 Summary

This chapter has presented the quantitative data analysis using descriptive and other analytical statistics to address the research problem and meet its objectives. Descriptive statistics were employed; including frequencies and measures of central tendencies where appropriate. It was found that descriptive statistics are the most appropriate because of the nature of the study objectives to identify TNA in the Iraqi construction industry, and in addition, to explore the nature of TAN in Iraqi construction companies. Other inferential statistics were used in this study, such as: the One-Sample Kolmogorov-Smirnov Test, the Kruskal-Wallis H test, Chi-Square, ANOVA and the Post-Hoc- test. These were employed as the researcher decided to test the significant differences between construction engineering groups. Thesis statistics tools helped the researcher to compares the sample means of the groups: the results which emerged from quantitative data analysis (Bryman &Cramer, 2001, p. 134). The results of the One-Sample Kolmogorov-Smirnov Test for site management problems, training indicators and barriers for all four groups are listed in the appendices (see appendices 5, 6 & 7), illustrate that there were significant differences between scores for each variable in the groups. As for ANOVA, it shows that each variable for construction site management problems, training indicators and barriers was analysed and the p-values for each of the questions were lower than the acceptable threshold of 0.05. This indicates that the mean is significantly different among all groups. However, there were no significant differences for some variables. For example, for training barriers, there was found to be no significant difference for lack of expertise and lack of employees interested in a skills development programme. Post hoc multiple comparison testing was needed to establish exactly where the differences between groups were (see Table 2 in appendix 2; Table 3 in appendix 3 and Table 4 in appendix 4). This test examined all group results for differences between means and all possible combinations of means. Kruskal-Wallis H test, Chi-Square was run for TNA methods and it was found that there were no differences between all groups regarding performance appraisal and site visits.

This study was undertaken to understand needs assessment in the Iraqi construction industry and to observe existing skills and knowledge gaps in the construction industry. The study highlighted the key problem areas in conducting TNA, as well as the drivers for TNA. The study findings revealed that 'on-site management and administration' are the areas where problems occur most frequently on construction sites. Therefore, the construction companies should be prepared to deal with on-site problems by providing proper TNA in systematic and efficient methods. The results also revealed that the current TNA practices in the Iraqi construction industry are assessed on an ad-hoc basis, i.e., TNA is only conducted if there are performance problems detected using performance appraisal and direct observation; this is not a surprising result as the researcher feels that the workforce's needs in Iraqi construction companies are often neglected, and attention is only paid to the company's needs. The TNA processes can be effectively used on the construction site to enable employees to gain skills and knowledge to be used in the future.

Regarding skills and knowledge needs in the Iraq construction industry, it appeared that the majority of respondents from all different groups are aware of the importance of project management skills and knowledge for site admin. However, a significant number shows there is a shortage of skills and knowledge in those areas (construction management skills and knowledge for site management), therefore the study also reveals that training is evident and very necessary for Iraqi construction engineers for those skills and knowledge. It comes also as surprise a findings from the study that although there is great need for skills and knowledge in construction industry, but the Iraq construction industry still does not have any systematic methods for the assessing employees' needs. To sum up , There is some evidence, however, both of lack of expertises and lack of top management support to TNA in Iraqi construction industry (where there is a lack of appropriately qualified staff available to assess companies employees needs, and lack of support of top managers in conducting needs assessment in their companies) and also problems of skill and knowledge gaps (where there are particular deficiencies in the skills and knowledge for those four construction engineers groups that are available) in the Iraq construction industry .In terms of skills and knowledge needs, the research indicates certain disciplines, including project management skills and knowledge for management site admin are seen as particularly likely to be the top priorities in terms of future skills and knowledge needs in Iraqi construction industry .

The next chapter is devoted to the development of such models for this research, and indeed for any other systematic research into the TNA of the Iraq construction industry; research that is essential in the search for skills and knowledge improvement in the Iraq construction industry. The integration of TNA models into the Iraqi construction industry will address the skills and knowledge problems, and result in significant benefits to the construction companies.

Chapter 5: Key Findings and the Development of Four Conceptual Models of TNA for the Construction Engineering Disciplines

5.1 Introduction

Following the preliminary analysis presented in chapter four, this chapter addresses the development of the substantive model. As already explained (see chapter four), for the purpose of this thesis, the substantive models are developed for TNA in the Iraqi construction industry. From a total of 330 questionnaires distributed, 239 questionnaires were returned to the researcher and 91 refused to participate in answering the survey. That means there was a response rate of 72.4% from the construction engineers. According to Leech, Barrett & Morgan (2005), response rates in the 70% to 80% range are viewed as very good and valid to carry out any research study. Participating engineers came from the Capital, Baghdad and various cities in the south of Iraq: Najaf, Kuit and Basra city. There are 82 site managers , 33 project leaders, 64 civil engineers and 60 architects rated their responses according to a five-point Likert scale, ranging from 1 for 'strongly disagree' to 5 for 'strongly agree' and from 1 for 'not important' to 5 'very important'. The researcher's reasons for a non-response sample in this study are due to several factors. Firstly, the nature of respondents may differ and their disposition may vary from cheerfully cooperative to hostile. Differences may occur between cultures, social classes and demographic categories, according to Kish (1965, p. 533). The researcher has also used the Statistical Package for Social Sciences software (SPSS, V19.) for the purposes of statistical analysis. In order to have a good sample, it must be of sufficient size to reflect the full diversity of that population. Approaching 317 people is a good size in carrying out research, and this lead to accurate statistical analysis, and the results are thus would be more meaningful. The justification for these models comes from the rising interest in human resource development in construction in general, and in Iraq in particular, as a means to develop, improve and upgrade the skills and knowledge of employees in construction in order to achieve the required level of effectiveness which is necessary for Iraq to remain competitive in the region. The shortage of skills and knowledge in construction motivated the researcher to undertake this study and develop models that's help to identify the skills and knowledge gaps in today's Iraqi construction industry. Before undertaking a full needs analysis, the divers for conducting training needs assessment must first be identified. There are four trigger for needs identification: 1) site management administration problems, 2) technical problems, 3) poor communication, 4) a shortage of skills and knowledge. When a company takes into account all four triggers in identifying their needs, the organization can be viewed as having needs assessment identification. Subsequently, there are four mechanisms within the second stage (input stage) which have an impact on conducting TNA in organizations, these are: barriers to TNA, data methods, and methods techniques and criteria. The middle level is more tactically oriented. Its focus is on meeting internal organizational needs, such as improving employee competencies. The third stage (process) is to highlight job skills needs at the three levels: organizational, task and individual; this looks at the knowledge and skills requirements of each specific job and compares these requirements to employees' actual knowledge and skills. In the final stage, the model output leads to an efficient determination and prioritization of training needs for employees, this is performed on an individual level to determine what skills and knowledge a person must develop. Having identified the skills and knowledge needs for employees, the TNA outcome will lead to effective training results.

A systematic approach to training should begin by identifying performance problems. Therefore, needs assessment and analysis is regarded as the first step in any training program (Leigh, et al., 2000). Two different kinds of need in organizations can be identified: 'diagnostic' needs are linked to the skills required to perform tasks. Gaps in diagnostic needs require training to improve current performance or endeavours to identify future obstructions to performance. 'Compliance' needs are gaps associated with meeting federal regulations such as safety or diversity. The training needs of a company can differ within the organization. Brown and Read, 1984) propose that needs analysis should occur at three levels:

Organisation analysis examines the organization's objectives and goals, resource needs and efficiency indices in order to determine where training is needed. Task analysis requires establishing performance standards; what tasks must be performed for standards to be achieved, how tasks are performed and the requisite knowledge and skills necessary to perform those tasks, in order to determine the content of training.

Identification of training needs helps construction companies in Iraq to conduct successful training, whereas recognising non-training needs helps make management decisions regarding solutions other than training. Therefore, based on a review of the relevant literature we propose a model (see models). This study, which is descriptive in nature, is aimed at investigating the backgrounds of TNA that close skills gaps when practiced in construction organisations. The literature has been used as a foundation for developing conceptual models for TNA, as well as theories regarding the importance of drivers of TNA, and the literature indicates the variables for TNA. No studies have been conducted on aspects of Iraqi construction industry on the training requirements of the construction workforce in general or on management skills in Iraq. However, after 2003 the situation in Iraq has required new approaches and strategic plans, in order to ease the critical lack of skills and knowledge gap in the construction industry (CURT, 2006). Enabling improvements in the quality of Iraqi construction projects requires a focus on employees having more effective skills. Hence, TNA is considered to be essential for addressing the skills gap in Iraq. The Iraqi government has carried out some construction sector reforms and workshops on improving employees' skills. The main reason for these workshops was to assess the skills and knowledge needs of construction employees; according to these assessments training is required in the area of management skills. This confirms that the need for training assessment is a pre-requisite before putting any available resources into training construction engineers. Rues & Byars (2000) reported that needs assessment is a systematic analysis of specific training activities, which are required to achieve certain objectives. A needs assessment of construction engineers was made in this study by considering the skills and knowledge requirements of Iraqi construction organizations. According to the requirements, the following conceptual models was designed for the needs assessment to identify discrepancies and skills and knowledge gaps for all participants in construction engineers groups, such as: site managers, project leaders, civil engineers and architects. The study revealed that a large majority of particpants could benefit from TNA and that there was a skills and knowledge shortage especially in construction management, and the management and administration of sites under construction organizations. Therefore, the engineering workforces do perceive the importancce of TNA and they do feel the need for training to fill the skills and knowledge gaps in their organizations. To overcome this deficiency in skills and knowledge conceptual models have to be put in place and to be followed for the training needs programme to be emperical. In this study attempts have been made to propose TNA models for construction indsutry that is based on emperical evidence.

5.2 Development of a Conceptual model of TNA for Site Managers

The model below provides some very useful descriptive and frequency statistics, including the means, for the 80 site managers participating in this study.

- **Construction Site Problems (Drivers):** data showed that poor communication is the most common problem for site managers (61 strongly agree and 21 agree, with a mean of 4.74), followed by site management and administration problems (43 strongly agree, 37 agree and 3 neutral, with a mean of 4.50).
- **Barriers to Training Needs:** data revealed that site managers believed a lack of job descriptions to be the main barriers to conducting TNA (59 strongly agree, 20 agree and 2 neutral, with a mean 4.67), followed by a lack of support from top management (50 strongly agree and 30 agree, with a mean of 4.60) and a lack of adequate expertise (41 strongly agree, 43 agree and 7 neutral, with a mean of 4.41).
- **Indicators of Training Needs:** site managers believed organizational performance problems are key indicators for conducting TNA (60 strongly agree and 20 agree, with a mean of 4.73), followed by meeting changes in the working environment (40 strongly agree and 25 agree, with a mean of 3.92).
- **Training Needs Methods:** the preferred method for delivering training needs by site managers is performance appraisal (38 strongly agree, 40 agree, 3 neutral and 1 disagrees, with a mean of 4.20), followed by on-site field visits (10 strongly agree and 49 agree, with a mean of 3.81).

- **Criteria of Data Collection Methods:** it was found that availability of HR expertise is the most important (37 strongly agree, 41 agree and 3 neutral, with a mean of 4.19) followed by top management preference (20 strongly agree, 47 agree and 17 neutral, with a mean of 3.90).
- **Training Needs Techniques:** it was found that PEST analysis was the most widely used technique by the organizations' site managers (10 always, 40 frequently and 10 seldom, with a mean of 2.46), the second most popular was organizational scans (14 seldom, 47 rarely and 19 never, with a mean of 1.91).

- **Importance of TNA (outcome):** as for the importance of TNA: data shows that site managers accept the statement that TNA plays an important role in achieving improvement in training effectiveness (59 strongly agree and 23 agree, with a mean of 4.71), followed by TNA being used as guidance for career development (45 strongly agree and 31 agree, with a mean of 3.47) and organizational goals achievement (20 strongly agree, 45 agree and 15).
- **Skills and Knowledge Needs Assessment:** site managers were asked to rate the importance of a skill and/or knowledge item and the extent to which they have that skill and/or knowledge item. Based on this, the training needs gap for different skills and knowledge was calculated and the mean scores were presented. Data showed that the most important skill was perceived to be project management, with the highest mean score of 4.81 (67 very important and 15 important), followed by technical skills (51 very important and 31 important, with a mean of 4.62). The lowest level of skills possessed was project management (43 poor and 38 fair, with a mean score of 1.47), followed by technical skills (35 poor, 34 fair and 11 average, with a mean score of 1.60). The training needs gap was relatively greater for ***project management skills, followed by technical skills***.

  It can also be observed from the survey results, that the training needs gap, as perceived by site managers is not much for all knowledge. Data also showed that the most important knowledge need was site management administration, with the highest mean of 4.20 (70 very important and 11 important), followed by knowledge of production (56 very important and 24 important, with a mean of 4.15). However, the least knowledge possessed was also in the area of site management and administration (36 poor and 45 fair, with a mean score of 1.56), followed by construction technology (41 poor, 32 fair and 7 average, with a mean score of 1.59). These areas of knowledge need more attention in terms of training and the training needs gap is relatively large for site management administration and knowledge of construction technology.

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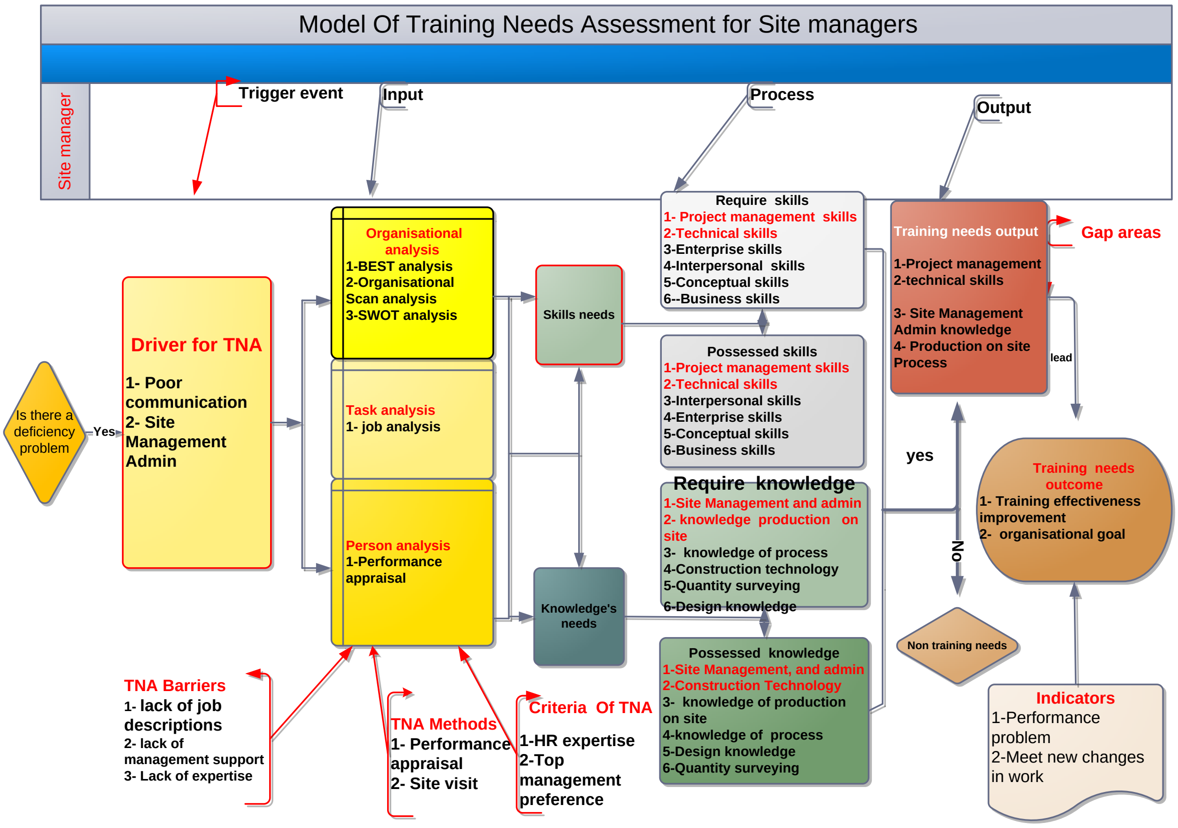
Figure 5-1 Conceptual model development of TNA for site managers



As identified in Figure 5-1 above, this model helps us to understand the assessment needs of site managers in the Iraqi construction industry. To start with the first phase, this model is likely to further support the view that site managers consider poor communication and poor site management administration as the main drivers for TNA for site managers in the construction industry. This is attributed to the fact that in most Arab countries, including Iraq, rapid changes occurred after independence and nationalization: such as expansion of the public sector; this, in turn, lead to an increased demand for workers to fill managerial positions (Atiyyah, 1993). Less capable employees, who lacked any in-depth knowledge of management, often filled management positions in these countries; therefore the need for management training became apparent. Hence, post-independence most Arab governments were faced with severe shortages of professionals, managers and skilled labour. Governments reacted to this by investing in formal education at all levels. However, training to develop the managerial skills of employees in particular received little attention at this stage, because it was still generally believed that management competence could be acquired either through experience, or even sometimes by friendship. Atiyyah (1993) argues that Arab managers invest more in strengthening their positions within their organizations and humanizing their personal relations with their supervisors than developing their skills and knowledge needed for their organization. Moreover, Abdalla and Al-Homoud (1995) argue that personal connections, nepotism, sectarian and ideological affiliations, negatively influenced training effectiveness.

In the input phase, the model consists of an organizational analysis, operational analysis and a personal analysis. Hence, this phase shows that the TNA model has not been applied comprehensively. It has been found that the application of training programs set by TNA were mostly either rare or seldom, despite the adoption of the full TNA model by Iraqi construction firms. This indicates that the companies depend on techniques, which are useful only for improving the company's policy, or that perhaps they are not aware of the importance of conducting TNA at all the TNA levels. As a result, they do not give full attention to other cases such as job analysis, monitoring absenteeism, labour turnover, complaints or a decrease in an individual's performance. This obviously leads to ineffective and inefficient TNA outcomes.

At the same stage of TNA the best methods for site managers were performance appraisal followed by site visits because those methods could make very accurate judgments regarding employees' performance. This finding for site managers concurred with Agnaia's (1996), who found performance appraisals to be one of the predominant TNA approaches or techniques in Libyan companies. It is possibly no surprise to find that performance appraisals are selected as the best method by site managers, as they are considered the most common and widely used method of TNA for most organizations (Brown, 2002; Osborne, 1996). In order to implement those methods effectively and efficiently site managers assumed staff with HR expertise to be essential for the TNA method of data collection.

In the input phase, TNA could face difficulties that impede the conduct of TNA in organizations. It was found that a lack of a clear job description followed by a lack of upper management support is considered as the main barrier facing site managers in the Iraqi construction industry. This could be very common in most Arabic organization. This finding corresponds with Al-Faleh (1985), who argues that most Arab organizations lack job descriptions, clear performance appraisals and that the approach used for assessing the needs of employees was impressionistic rather than systematic.

In the process phase, after TNA is identified, there are certain important skills and knowledge that are required to enrich employees' abilities in the Iraqi construction industry sector. In this phase, the model starts to diagnose the required skills and knowledge, and the skills and knowledge possessed by employees; afterwards, the output phase is the conclusion as to whether the model indicates either training or non-training needs, and in some cases, both. Within the context of training needs drawn for the research, it emerged that the urgent need to train site managers was conceived to be common in the Iraq construction industry. As identified in above flow-chart, there are great gaps in project management skills, technical skills and knowledge of site-management administration for site managers; therefore training needs are evident for these areas of skills and knowledge. This can provide us with an image that Iraqi construction site management suffers from a deficiency of the right calibre of management in general, and a lack of proper construction project management, in particular. This is due to the dissemination of a cultural of: concentrating on technical expertise development; not paying proper attention to the advancement of the individuals' aptitudes; and not improving the construction knowledge-base, as a whole. Technical skills and managerial skills are both required to meet the demands of the construction business environment. The key role of site managers and the importance of their managerial and technical skills, are increasingly being recognised in Iraq at the present time, though perhaps not sufficiently within many small firms. The role of site managers in construction has become increasingly critical and requires a different mix of skills (both technical and construction project management skills).

Non-training needs that have no skills or knowledge deficiency for site managers are: conceptual skills, business skills, design technology skills and quantity-surveying knowledge. Lastly, the training needs assessment outcome from site managers' point of view is to achieve and improvement in training effectiveness.

5.3 Development of a Conceptual Model of TNA for Civil Engineers

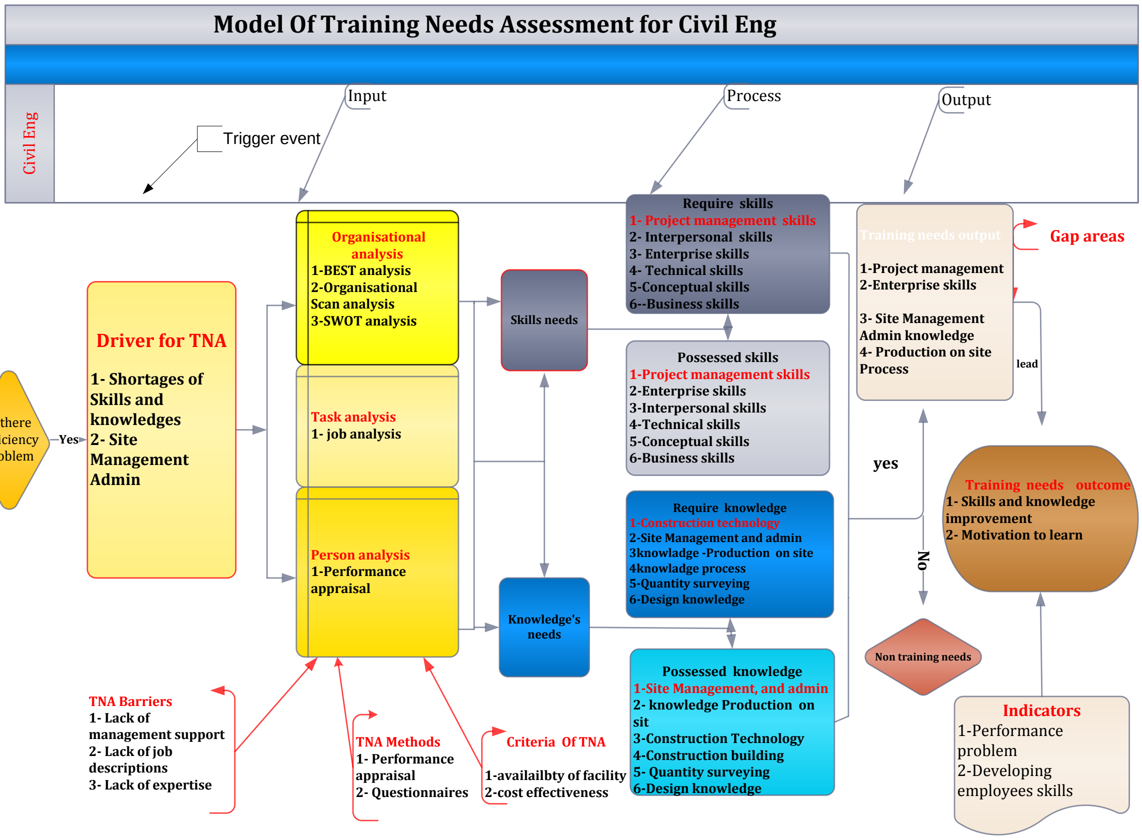
The model below provides some very useful descriptive and frequency statistics, including the means, for the 64 civil engineering participants in this study.

- **Construction Site Problems:** the data illustrates that a shortage of skills and knowledge is the most common problem for civil engineers (32 strongly agree, 31 agree and 1 neutral, with a mean of 4.77), followed by site management administration problems (12 strongly agree, 37 agree and 15 neutral, with a mean of 4.50).
- **Barriers to Training Needs:** data indicates that civil engineers considered a lack of support from top management to be the main barrier to conducting TNA (50 strongly agree, 10 agree and 2 neutral, with a mean of 4.80), followed by a lack of job description (38 strongly agree, 24 agree and 2 neutral, with a mean of 4.56) and a lack of adequate expertise (25 strongly agree, 33 agree, 5 neutral, 1 disagrees, with a mean of 4.30).
- **Training Needs Indicators:** civil engineers believe that organizational performance problems are a key indicator for conducting TNA (34 strongly agree, 29 agree and 1 neutral, with a mean of 4.51), followed by the development of employee skills to fill a current need (12 strongly agree, 41 agree, 10 neutral and 1 disagrees, with a mean of 3.40).

- **Training Needs Methods:** the preferred delivery method for training needs for the civil engineers was performance appraisal (8 strongly agree, 28 agree, 26 neutral and 2 disagree, with a mean of 4.18), followed by questionnaires (10 strongly agree and 49 agree, with a mean of 3.56) and on site field visits (5 strongly agree and 25 agree, with a mean of 3.10).
- **Criteria of Data Collection Methods:** data indicates that civil engineers considered the availability of facilities to be most important (12 strongly agree, 49 agree and 1 neutral, with a mean of 3.70), followed by cost effectiveness (10 strongly agree, 48 agree and 4 neutral, with a mean of 3.55).
- **Training Needs Techniques:** data indicates that for civil engineers, PEST analysis was the technique most widely used by organizations (14 frequently, 4 seldom, 36 rarely and 16 never, with a mean of 2.10) and the second most popular technique was the organizational scan (4 frequently, 18 seldom, 27 rarely and 10 never, with a mean of 1.81).
- **Importance of TNA (outcome):** data illustrates that civil engineers supported the statement that TNA has a role in improving the level of knowledge and skills (47 strongly agree 13 agree and 4 neutral, with a mean of 4.67), followed by support for the statement, TNA helps to increase trainees' motivation to learn (38 strongly agree, 19 agree and 7 neutral, with a mean of 4.48).
- **Skills and Knowledge Needs Assessment:** civil engineers were asked to rate the importance of a skill and/or knowledge item and the extent to which they have that skill and/or knowledge item. Based on this, the training needs gaps for different skills and knowledge were calculated and the mean scores presented. The data show that the most important skill, with the highest mean score of 4.78, is project management (50 very important and 14 important) followed by interpersonal skills (21 very important, 38 important and 3 not sure, with a mean of 4.62). However, project management skills were the least possessed (19 poor and45 fair, with a mean of 1.29), followed by enterprise skills (18 poor, 39 fair and 2 average, with a mean of 1.82). Therefore, the training needs gap is relatively large for ***project management skills and enterprise skills***. From the survey, it was found that the training needs gap in terms of knowledge of site management administration is not perceived to be much, by civil engineers. Data revealed that the most important knowledge needed

by civil engineers is knowledge of construction technology (29 very important, 34 important and 1 not sure, with a mean of 4.51), followed by site management administration knowledge (12 very important and 41 important, with a mean of 4.00). However, site management administration knowledge was considered to be the least possessed (48 poor and 14 fair, with a mean of 1.56), followed by product knowledge (19 poor and 32 fair, with a mean of 1.57). Therefore, the training needs gap is relatively large for ***knowledge of site management administration and knowledge of on-site production*** and these areas need more attention in terms of training.

Figure 5-2 Development of a conceptual model of TNA for civil engineers



The model above shows us the needs assessment for civil engineers in the Iraqi construction industry. It has been noticed there are some difference from previous model (site manager), and this could be due to their different roles and needs in the construction industry. To start with, in the first phase of the model (trigger event), it emerges that a shortage of skills and knowledge in the Iraq construction industry is considered as the main driver for civil engineers, followed by site management administration. This is attributed to several factors, such as: migration of skilled people, insufficient wages, poor working conditions and an unstable political situation, which could lead to create a skills and knowledge gap in the Iraqi construction industry. Therefore, TNA must be performed effectively in the Iraqi construction industry to avoid the risk of a skills and knowledge shortage.

The input phase for civil engineers consists of an organizational analysis, an operational analysis and a personal analysis. In this phase, attention is only paid to organizational analysis, that is to say: TNA was not conducted comprehensively. This result leads us to think that TNA in the Iraq construction industry is considered as a **"*stand alone*"** process with no ties or links to other levels of analysis such as task and personal analyses. This finding corresponds with Abdalla and Al-Homoud’s (1995) study, in which they found that in some Arab organizations, training needs assessment time is viewed as a vacation or leisure time for the trainees who leave their current jobs for the lecture room or a game and some fun, and therefore training needs assessment is rarely conducted and not comprehensive. According to the result from the civil engineers, we can assumed that construction companies in Iraq did not pay full attention all the TNA stages and this might be due to company policy, which is only concerned with company strategy, rather than developing their employees’ performance.

In the output phase, TNA for civil engineers faces some obstacles that might hinder the process of conducting TNA in their organizations. It emerges that the lack of management support and job descriptions were main barriers. This is attributed to the fact that most top management in Arab countries, including Iraq, is not interested in any training development programmes and also that they are not aware of how essential TNA is for their organizations. To further support this argument, Agnaia, (1996) found that in most Arab organizations the selection of managers is not based on merit, but rather on subjective criteria such as loyalty to superiors, political affiliation, tribal, kinship and personal connections. Therefore, it can be observed that less capable managers, who have poor knowledge of TNA, will give little support to training needs assessment in their organizations. In same stage, as identified in the above model, civil engineers have chosen performance appraisal followed by questionnaires as the best data collection methods for TNA. The reason for selecting questionnaires as the second best method is due to cost-effectiveness and ease of administration over a large population; in addition, this method is straightforward and easy to analyse (Jamil, 2006). Civil engineers assumed the most important criteria that must be considered for effective TNA data collection to be the availability of facilities and cost effectiveness.

In the process phase, TNA was conducted to identify the most specific skills and knowledge needed for the Iraqi construction industry. Then, the output phase concludes as to whether the model indicates either training or non-training needs, and in some cases both, and it indicates the outcome of TNA. The evidence from the civil engineering employees showed that significant numbers have a shortage of relevant skills and that there are also areas of knowledge deficiency within the existing engineering workforce. They believed that training needs are greater for project management skills, enterprise skills, knowledge of site management administration and knowledge of on-site production. Based on the aforementioned findings we can assume that civil engineers are more interested in gaining managerial skills and knowledge of site management administration than technical skills and knowledge of construction technology. It can be interpreted that civil engineers are well educated at reputable universities and possess vast technical skills and construction technology knowledge, but they are poorly endowed with managerial skills.

Non-training needs that have no skills or knowledge deficiency for civil engineering are: conceptual skills, business skills, design technology knowledge and quantity surveying knowledge. Lastly, the training needs assessment outcomes, from the civil engineers' point of view, are to achieve better skills and knowledge and to motivate employees to learn.

5.4 Development of a Conceptual Model of TNA for Project Leaders

The model below provides some useful descriptive and frequency statistics, including the means for the 32 project leaders who participated in this study.

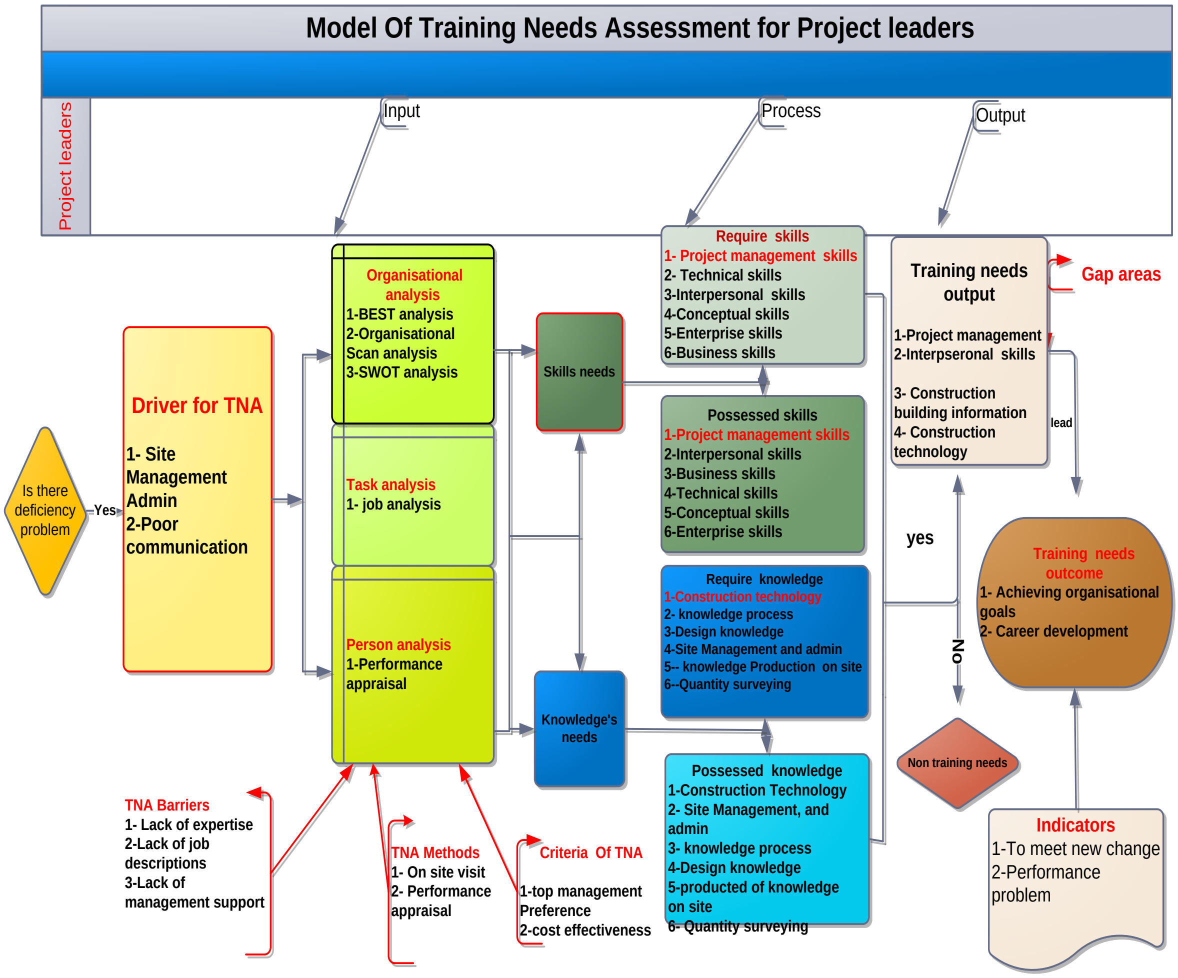
- **Construction Site Problems:** data illustrates that site management administration problems were the most common for project leaders (23 strongly agree and 10 agree, with a mean of 4.69), followed by poor communication (17 strongly agree and 15 agree, with a mean of 4.48).
- **Barriers to Training Needs:** data indicates that project leaders considered a lack of adequate expertise to be the main barrier to conducting TNA (18 strongly agree and 14 agree, with a mean of 4.51), followed by a lack of job descriptions (16 strongly agree, 13 agree, 3 neutral and 1 disagrees, with a mean of 4.33) and a lack of support from management (9 strongly agree, 19 agree and 5 neutral, with a mean of 4.20).
- **Training Needs Indicators:** data indicates that meeting new changes in the working environment was a key indicator for conducting TNA for project leaders (27 strongly agree and 6 agree, with a mean of 4.81), followed by organizational problems (20 strongly agree, 10 agree and 3 neutral, with a mean of 4 50).
- **Training Needs Methods:** the preferred method for delivery of training needs for project leaders is on-site visits and observations (18 strongly agree and 15 agree, with a mean of 4.54), followed by performance appraisals (9 strongly agree, 17 agree and 7 neutral, with a mean of 4.06) and questionnaires (6 strongly agree, 14 agree, 8 neutral and 5 disagree, with a mean of 3.90).
- **Criteria of Data Collection Methods:** data reveals that top management preference is most important criteria (21 strongly agree and 12 agree, with a mean of 4.56), followed by cost effectiveness (18 strongly agree and 15 agree, with a mean of 4.54).

- **Training Needs Techniques:** data reveals that among project leaders PEST analysis was the technique most widely used by organizations (5 frequently, 20 seldom, 7 rarely and 4 never, with a mean of 2.84) and the second most popular technique was an organizational scan (5 frequently, 16 seldom, 6 rarely and 5 never, with a mean of 2.15).

- **Importance of TNA (outcome):** data illustrated that project leaders accepted the statement that TNA plays a key role in achieving organizational goals (24 strongly agree and 9 agree, with a mean of 4.75), followed by TNA being used as guidance for carer development (26 strongly agree, 4 agree and 3 neutral, with a mean of 4.69) and training effectiveness (8 strongly agree and 25 agree, with a mean of 4.40).

- **Skills and knowledge Needs Assessment:** project leaders were asked to rate the importance of a skill and/or knowledge item and the extent to which they have that skill and/or knowledge item. Based on this, the training needs gaps for different skills and knowledge were calculated and the mean scores presented. Data showed that the most important skill, with the highest mean score of 4.87, was project management (29 very important and 4 important), followed by technical skills (19 very important and 13 important, with a mean of 4.51). However, the skills least possessed were in the area of project management (15 poor and 17 fair, with a mean score of 1.57), followed by interpersonal skills (4 poor and 22 fair, with a mean score of 2.12). Therefore, the training needs gap is relatively large for ***project management skills and interpersonal skills***. From the survey, in the knowledge needs assessment, project leaders perceived that the training needs gap was not much for all knowledge. The survey data showed that the most important knowledge needed for a project leader was in construction technology (25 strongly agree and 6 agree, with a mean of 4.79), followed by site management administration knowledge (19 strongly agree and 9 agree, with a mean of 4.50). However, the knowledge least possessed was found to be in construction technology (21 poor and 8 fair, with a mean score of 1.48), followed by management and administration knowledge (13 poor and 9 fair, with a mean of score 1.63). Therefore, in terms of knowledge, the training needs gap is relatively large in ***construction technology and site management administration knowledge.*** So, these areas of knowledge need more attention in terms of training.

Figure 5-3 Development of a conceptual TNA model for project leaders



Based on data collected from the project leader respondents, findings and conclusions were drawn and a model was designed. It was found that differences exist, based on this model of assessment needs, between the project leaders' group and other groups, namely site managers and civil engineers, and this could be due to the nature of their different positions, as well as their educational backgrounds and the roles they play within the construction industry. To start with, in the first phase of the model (trigger event), it was found site management administration was the main driver for TNA. It appears that management problems in construction projects seem to be a common theme in Iraq’s construction industry. This could be attributed to many reasons, for example: the recruitment and promotion of Arab employees, not based on merit, but rather on subjective criteria like loyalty to superiors, political affiliation, tribal kinship and personal connections, causing the wrong person to be employed in the wrong place. Another reason is the over-emphasis on academic qualifications in the recruitment and promotion of employees, with little attention paid to work experience, in both public and private organizations. This situation produces inexperienced and less capable people occupying managerial positions within organizations. This is an undesirable situation, as experience is noted to be an essential issue, not only in understanding how organizations are managed in real situations, but also as a rich source of ideas that can be used as training material (Atiyyah, 1991).

The input phase is the second phase, which consists of an organizational analysis, an operational analysis and a personal analysis. In this phase, according to the project leaders respondents TNA is not conducted in a wide-ranging capacity. It is exercised as a ***“stand alone"*** process, with no ties or links to other level of analyses, such as, task analysis and personal analysis. This could be attributed to the same reasons, outlined above. Moreover, in the input phase, project leaders see TNA as an impediment; this of course encumbers the process of conducting TNA. This possibly stems from a lack of expertise and job descriptions, which is known to be a very common problem in conducting TNA in most Arab organizations.

In the same stage, all project leaders gave priority to on-site visits and observation, followed by performance appraisal, as TNA methods. The main reason for choosing on-site visits as the best method was that observing the actions of employees on-site in their natural setting is particularly helpful in relating theory to practice. Hence, this finding gave credibility to that of Odusami *et al.* (2007): that companies prefer on-the-job training methods and they should be exercised on a regular basis. Theoretically, site visits enhance not only the cognitive learning outcome, they have a significant impact on the effective domain of the learning (Odusami et al 2007). Regarding the criteria for TNA methods, project leaders believe that the most important criteria is an effective TNA data collection method, where top management preferences are satisfied, followed by cost effectiveness.

In the process phase, TNA was conducted to identify the skills and knowledge needed most specifically by the Iraqi construction industry. Then, the output phase concludes with the question whether the model indicates training needs requirements, or non-training needs requirements (in some cases, both) and this produces the outcome of the TNA. The project leaders' group believed that training needs are greatest for project management, interpersonal skills, knowledge of processes and knowledge of construction technology. It was noticed from the model that project leaders are interested in striking a balance between managerial skills and knowledge of construction technology. This leads us to conclude that knowledge in construction technology and the possession of project management skills give project leaders the ability to make sound decisions in their pursuit of leading others to the completion of a successful project.

Non-training needs indicate no skills or knowledge deficiency; as envisaged by project leaders these are: conceptual skills, enterprise skills, knowledge of on-site production and quantity surveying knowledge. Finally, the training needs assessment outcome, from the viewpoint of project leaders, is that of achieving both organizational goals and career development.

5.5 Development of a Conceptual Model of TNA for Architects

The model below provides some very useful descriptive and frequency statistics, derived from this study, including the means for the 64 participating architects.

- **Construction Site Problems:** data illustrates that a shortage of skills and knowledge was the most common problem for architects (38 strongly agree, 18 agree and 5 neutral, with a mean of 4.56), followed by poor communication (11strongly agree, 39 agree and 5 neutral, with a mean of 4.31).
- **Barriers to Training Needs:** data indicated that a lack of support from top management was seen to be the main barrier to conducting TNA (43 strongly agree and 13 agree, with a mean of 4.66), followed by a lack of adequate expertise (32 strongly agree, 26 agree and 2 neutral, with a mean of 4.50) and lack of job descriptions (32 strongly agree, 23 agree, 4 neutral, and 1 disagrees, with a mean of 4.48).
- **Training Needs Indicators:** data pointed to the development of employees' skills to fill a current need being a key indicator for conducting TNA (31 strongly agree, 23 agree, 5 neutral and 1 disagrees, with a mean of 4.40), followed by organizational problems (22 strongly agree, 30 agree and 8 neutral, with a mean of 4.23).
- **Training Needs Methods:** data shows that the preferred methods for the delivery of training needs, according to architects, is by questionnaire (20 strongly agree, 29 agree, 7 neutral and 3 disagree, with a mean of 4.06), followed by performance appraisal forms (12 strongly agree, 35 agree, 11 neutral and 1 disagrees, with a mean of 3.95) and on-site visits and observations (6 strongly agree, 29 agree, 24 neutral and 1 disagrees, with a mean of 3.80).
- **Criteria of Data Collection Methods:** it was found that the time required was considered most important (24 strongly agree, 27 agree and 13 neutral, with a mean

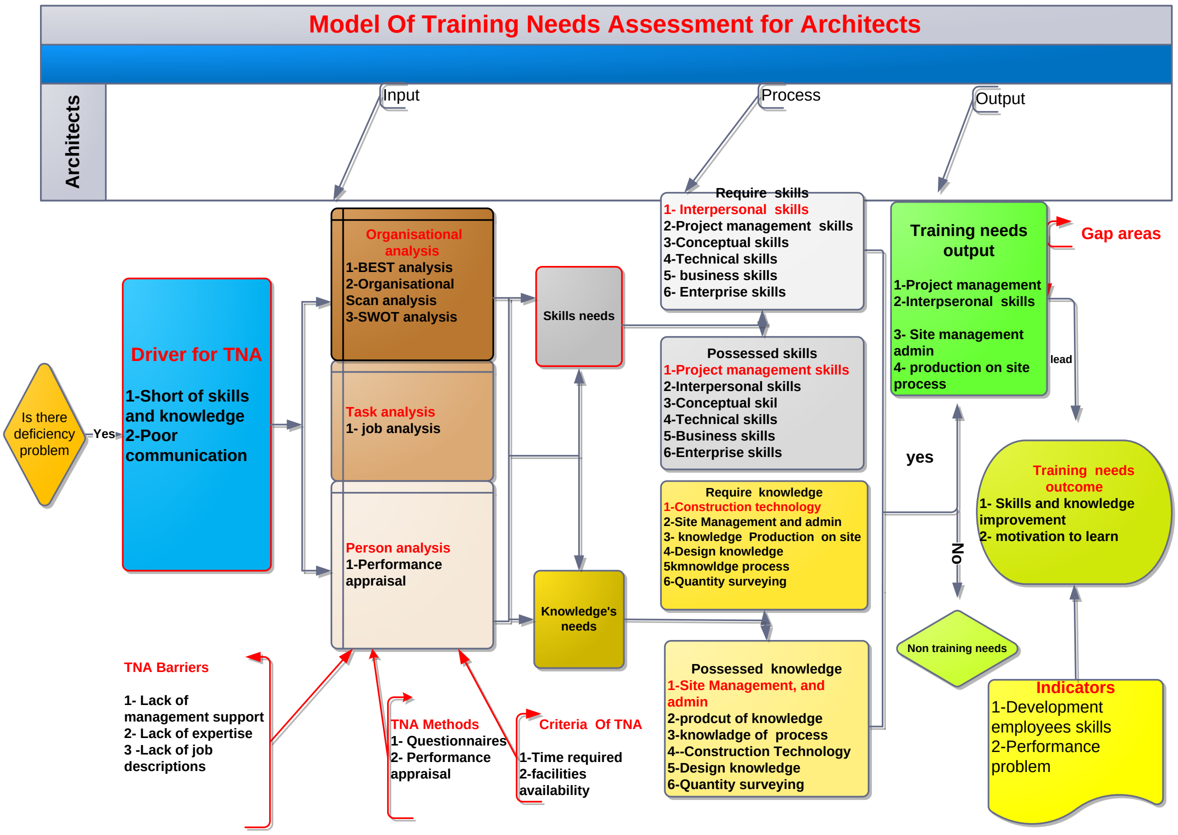
of 4.10) followed by availability of facilities (14 strongly agree, 37 agree, 10 neutral and 4 disagree, with a mean of 4.0).

- **Training Needs Techniques:** PEST analysis was the most widely used technique by organizations (8 frequently, 14 seldom, 22 rarely and 20 never, with a mean of 2.45) and the second most popular technique was the organizational scan (5 frequency, 7 seldom, 20 rarely and 27 never, with a mean of 1.91).
- **Importance of TNA (outcome):** data indicated that architects accept the statement that TNA helps to improve the level of knowledge and skills of employees (47 strongly agree and 13 agree, with a mean of 4.76), followed by TNA being useful to motivate employees to learn (32 strongly agree, 19 agree and 9 neutral, with a mean of 4.38) and providing cost-effective training (21 strongly agree, 32 agree and 7 neutral, with a mean of 4.15).

- **Skills and Knowledge Needs Assessment:** architects were asked to rate the importance of a skill and/or knowledge item and the extent to which they have that skill and/or knowledge item. Based on this, the training needs gap for different skills and knowledge was calculated and the mean scores presented. Data showed that the most important skills, with the highest mean score of 4.75, were interpersonal skills (45 very important and 15 important) followed by project management skills (19 very important and 13 important, with a mean of 4.68). However, project management skills were considered to be the least possessed (33 poor and 25 fair, with a mean of 1.51), followed by interpersonal skills (10 poor and 44 fair, with a mean of 1.96). Therefore, the training needs gap is relatively large for project management skills and interpersonal skills. Furthermore, with respect to knowledge needs, architects do not perceive much of a training needs gap, as the data revealed that the most important knowledge need for architects was in construction technology (29 strongly agree and 34 agree, with a mean of 4.51). This was followed by site management administration knowledge (12 strongly agree and 41 agree, with a mean of 4). However, the least possessed knowledge was in the area of site management administration (45 poor and 15 fair, with a mean of 1.23), followed by production knowledge (11 poor and 42 fair, with a mean of 1.91). Therefore, the training needs gap is relatively large in the areas of ***site management administration and***

knowledge of production; these need more attention from the point of view of training.

Figure 5-4: Development of a conceptual TNA model for architects



Data was collected from the architect respondents, findings noted, conclusion drawn and a model was designed. Differences were found between all four groups regarding TNA for the Iraq construction industry. However, the differences between civil architects and civil engineers are less significant than those between project leaders and site managers. This is attributed to the fact that site mangers and project leaders can have similar job roles that emphasise managerial positions, whereas civil engineers and architects are considered more as technicians by the construction industry.

To start with, first phase of the model (trigger event) found that a short of skills and knowledge was the main driver for TNA. This is attributed to the aforementioned reasons from the previous models: employment in Arab countries is not based on merit, but rather on less reliable subjective criteria (Atiyyah, 1991). The input phase is the second phase, it consists of an organizational analysis, an operational analysis, and a personal analysis. In this phase, according to the architect respondents, TNA is not conducted as a wide-ranging analysis. It is a ***"stand alone"*** process with no ties or links to other levels of analysis, such as task analysis or personal analysis. Moreover, in the input phase of TNA architects face impediments that impede the process of conducting TNA, such as a lack of management support and expertise. These barriers seem to be a very common problem in Iraq construction organizations. Because TNA sometimes leads to changes in the work environment, employees, particularly managers, always resisted, rather than encouraged, any changes. This result concurs with another previous study by Atiyyah, (1991,p 23): *'Arab managerial practices, including management T&D, are less interested in training programmes that lead to changes and are influenced by family status, tribal affiliation, religious ethics and rules, and personal connections and loyalty*.' Therefore, training development programmes in most Arabic organizations are viewed by employees as a time of leisure. This finding of a lack of expertise is consistent with Agnaia's (1996, 20) research study in Libya when he '*found that mangers who are in charge of assessing T&D needs are, usually, not specialists and they lack the necessary skills and knowledge for performing their tasks'*.

Apparently, employees in Arab organizations, particularly in Iraq, are sent to T&D programmes without proper needs analyses being conducted by specialised HR. Employees are attending these programmes in an attempt at getting promoted, rather than being motivated to attend training programmes to improve their current performance (Al-Ali, 1999; Attiyah, 1993; Abdalla and Al-Homoud, 1995; Agnaia, 1996). In the same stage, architects gave priority to questionnaires followed by performance appraisal as TNA methods. The criteria architects believed to be most important when collecting data for TNA were, the time required followed by the facilities availability.

In the process phase, TNA was conducted to identify the skills and knowledge which were needed most specifically by the Iraqi construction industry. The output phase concludes whether the model indicates either training or non-training needs, and in some cases both, and indicates the outcome of the TNA. Architects believed training needs are greater for project management and interpersonal skills, site management administration and knowledge of on-site production. It could also be noted that architects are interested more in managerial skills and knowledge of management, than in technical skills and knowledge of construction. This leads us to think that architects are well equipped with technical skills and knowledge of construction, but with respect to the skills and knowledge of management, they are less capable and have little experience. Therefore, training needs are greater for managerial skills and knowledge. Non-training needs that have no skills and knowledge deficiency, according to the architects are: technical skills, business skills, knowledge of construction technology and quantity surveying knowledge. Lastly, the training needs assessment outcome from the architects' point of view is to achieve organizational goals and career development.

5.6 Summary

The number of responses was very high for the questionnaire survey and provided an overall appreciation of training needs assessment in the Iraqi construction industry. This chapter has reviewed and discussed responses from different groups of construction engineers in the Iraqi construction industry to surveys conducted by researchers in various contexts. In general, most responders produced similar conclusions regarding their respondents' TNA practices, i.e., their approaches were quite distant from the adopted TNA theories of their companies and training needs assessment exits as a ***"stand alone"*** process with no ties or links to other aspects of the organization. The findings from these groups are probably sufficient for us to form a general idea regarding TNA practices in the Iraq construction industry and reveal that a large majority of particpants could benefit from TNA becuase there is a skills and knowledge shortage, especially in project management skills, and knowladge management and administration of sites under construction. Therefore, the engineering workforces do perceive the importancce of TNA and they do feel the need for training to fill the skills and knowledge gaps in their organizations. To overcome this deficiency in skills and knowledge in iraq, conceptual models have to be put in place and to be followed for the training needs programme to be actual. The survey recommends that engineers in the Iraqi construction industry should work towards improving their managerial skills through management training courses. The results show that project management skills and interpersonal skills are the most deficient as are the knowledge for site management and production knowledge. The results are probably sufficient to understand all the relevant details regarding training needs assessment practices including, methods used, barriers considered, and techniques employed, at all three levels of analysis.

Chapter 6: Validation of the Conceptual TNA Model for Construction Engineering Employees

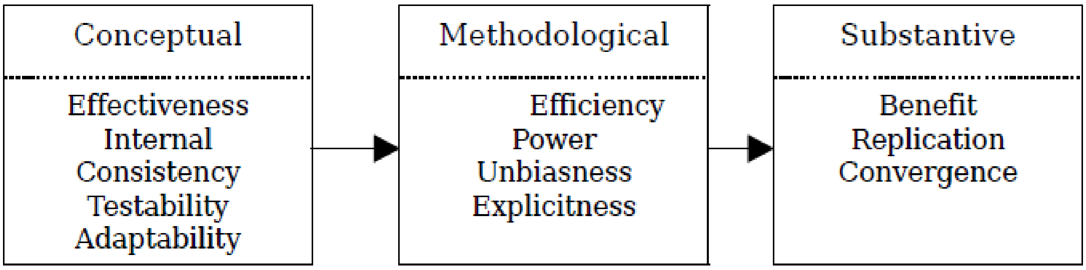
6.1 Introduction

This chapter addresses the validation of the TNA model developed for construction engineering employees in Iraq. The purpose of the validation process was to discover whether the concepts and methodologies used in developing the model were sound and also to establish whether the findings are reliable. Therefore, validation is vital because it reflects the potential objectivity and reliability of the model**.**

6.2 The Concept of Validation

Brinberg and McGrath, (1992) believed that '*the concept of validation has different meanings in the various stages of the research process especially the conceptual, methodological, and empirical domain'*. Figure (6-1) shows the framework of validation divided into three important stages, firstly; at the conceptual field, the validation can be recognized (among other things) by evaluating the effectiveness, internal consistency, testability and adaptability of the concepts used. Secondly, at the methodological field, it is likely that efficiency, power (rigour), lack of bias, and explicitness would prevail. Thirdly, at the substantive field, it is anticipated that the research should be beneficial or relevant in terms of any potential practical applications and should also be subject to replication and convergence towards identifying its boundaries (Ahadzie, 2007). Hence, following the development of the substantive model, its generalization and transferability have to be validated to make sure that it shows the characteristics of the general population, and that these are not specific to the samples used in the estimation.

Figure 6-1: Framework of validation.



Source: Adapted from Brinberg and McGrath (1985)

Generally researchers should consider all three fields for a reasonable assessment of methodology in research processes (Ahadzie, 2007; Brinberg McGrath, 1992). It is of importance that, although researchers believed both internal and external validation are important for validating the research process, literature is largely lacking on what form the internal validation process should take (Fellows *et al*., 2003). A recent study by Ahadzie (2007) used a beneficial technique to achieve effectively this integration into two dimensional methodology identified as; external and internal validation. External validation is particularly applied in terms of the substantive domain of the research process, whereas internal validation has been used in the conceptual and methodological domains. This study followed the technique of Ahadzie, (2007), in that both validation processes were used with respect to this study. Furthermore, in order to ensure the validity of the questionnaire, two statistical tests were also used in this study. The first test is known as the Criterion-related validity test (Spearman test) and it measures the correlation coefficient between each paragraph in one field and the whole field. The second test is the structure validity test (Spearman test), which is used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire that have the same level of similar scale.

6.3. External Validation

Face validity is a technique that was used as a test to validate the model in this study. Details of the results were then presented and experts approached to comment on relevant aspects of the model, including potential benefits (Brinberg & McGrath, 1985).

6.3.1. Test Results for External Validation

It is likely that this model might reflect the characteristics of TNA in Iraqi construction firms and it could be applied to other developing countries, particularly those in the Middle East where the circumstances might be similar to those in Iraq. The face validity technique involves asking people with experience and academics in the field of research whether the model is reasonable (Sargent 2000). TNA was evaluated using this method, with five experts approached to evaluate the model and by filling out a questionnaire in order to achieve this. Brinberg and McGrath, (1985) emphasised that it is important to measure any benefits of the model by, for instance, assessing how potential users (i.e. practitioners and experts) view the relevance of the findings (Figure 6.1).This means that, apart from establishing the predictive validity of models, it is also useful to approach experts and practitioners to assess whether the models correspond with reality.

6.3.1.1 Feedback from Experts on the Potential Relevance of the Findings with Respect to the Recommended Application

The questionnaire was tested by five contractors, each of whom was given full information about the research objectives. Each of them was requested to evaluate the validity of content for each item based on rating the index of content validity.

The questionnaires, as noted in the research methodology, were sent on the 1st August 2013 for validation. All the completed questionnaires were retrieved within seven days and faxed back to the UK on the 8th Aug 2013. In addition some comments by some of the experts were introduced. Tables 6 .1 and 6.2 provide details of the feedback received. The questionnaire (Appendix 16) first introduced the variables identified in the development of the model and asked respondents to assess them on a scale of 1-5. There was agreement amongst the respondents with over 90% indicating that these variables were either important or very important and that they agreed or strongly agreed (Table 6-1).

Table 6-1 Feedback from 5 respondents with respect to findings

Dependent Variables of construction site problems	SD	D	N	A	SA
1- Technical Problems			1	4	
2- Poor communication				2	3
3- Management site admin problems				1	4
4- Skills and knowledge of workers				5	
Dependent variables of TNA indictors	**SD**	**D**	**N**	**A**	**SA**
1- Development of employee skills to fill a current need				1	4
2- Career development				3	2
3- Organizational problems				2	3
4- Meet new changes in work environment				3	2
Dependent Variables of TNA barriers	**SD**	**D**	**N**	**A**	**SA**
1-Lack of financial resources;				2	2
2-Lack of adequate expertise				1	4
3-Lack of job descriptions				3	2
4-Unsystematic training approaches				1	4
5-Lack of support from top management				2	3
6-Lack of new workers interested in skills development programs				4	1
7-Waste of time and money				2	3
Dependent Variables of TNA Methods	**SD**	**D**	**N**	**A**	**SA**
1-On-site visits and observations				2	3
2-Performance appraisal forms				1	4
3-Questionnaires				2	3
4-Focus groups				3	2
5-Delphi method			2	2	1
6-Assessment centres			3	2	
7-Document reviews / examinations			3	2	
8-Advisory committee			4	1	
Technique of Organization analysis (organizational level)	**N (%)**	**R (%)**	**S (%)**	**F (%)**	**A (%)**
PEST analysis				1	4
Organizational scanning				3	2
SWOT analysis				4	1
Balanced scorecard			1	4	
Technique of Organization analysis (task level)	**N (%)**	**R (%)**	**S (%)**	**F (%)**	**A (%)**

Job analysis				2	3
Competency analysis				4	1
Managerial skills audit			3	1	
Skills inventory			2	3	
Technique of Organization analysis (individual level)	N (%)	R (%)	S (%)	F (%)	A (%)
Performance review				4	1
Repertory Grid Analysis			1	4	
Versatility chart / analysis			4	1	
Diary Analysis			3	2	
Dependent Variables -importance of TNA	SD	D	N	A	SA
1- Training effectiveness					5
2- Organizational goals				2	3
3-Training costs				1	4
4- Managing change			1	3	1
5- Professional development				3	2
6- Career development				1	4
7- Motivation to learn				4	1
8- Knowledge, skills and attitude				2	3
Skills types	1- Not important	2- somewhat important	3- not sure	4- important	5- very important
1-Project management skills					5
2-Technical skills				3	2
3-Interpersonal skills				2	3
4-Enterpsie skills				4	1
5-Conceptual skills			1	3	1
6-Business skills				4	1
Knowledge type	1- Not important	2- somewhat important	3- not sure	4- important	5- very important
1- Site Management administration				1	4
2-Building construction				4	1
3-Production processing site				2	3
4-Construction technology				3	2
5-Quantity surveying				4	1
6-Design knowledge			1	1	3

Regarding the problems and challenges facing construction companies, all experts agreed that management and administration of sites is a real problem on construction sites. That is, except for one project manager who said that inefficient time management was the most common problem facing his company and that it could be for the rest of the Iraqi construction companies. He supported his point of view with the following argument:

'*Nowadays in Iraq an intensely time-driven business environment, superior planning, scheduling, and control are vital in business life. A delay that happened in one of our constructing projects negatively affects our businesses and also the public at-large and results in extended overhead costs. In addition, a reputation for late completions is badly affecting our business, especially when negotiating work for new projects.*'

He also said that, '*socio-political pressures have more impact on construction than in the past'*. (Project manager)

Feedback from participants on the barriers to training needs indicated that lack of experts and unsystematic training programmes were the most common barriers to TNA. On this issue one academic commented on application of TNA in Arab organizations:

'*Regrettably TNA in most Arab organizations is just cut and paste from foreign contexts, without any consideration or attention to whether it is suitable for our culture, or not. So what happens usually is that some Arabic trainees go to western countries to get some knowledge of T&D but, in fact, all that they did was to translate these courses, without any consideration of the Arabic language and culture or of whether these programmes are suitable to our culture and religion; they do not even know their aim, just bringing new T&D programmes' name and concepts'*

One manager also said that in his organization:

'*Apparently TNA in our organization is conducted randomly and unsystematically; it is subject to personal consideration, relationships and friendships with top managers and the employees' direct managers.'* Family power and system and the dominant warm-hearted nepotism are main challenges that could face Iraqi construction organization in adopting any management development agenda. This finding is concurred with Durra (1991) study of the assessment training needs in the context of administrative reform in the Jordanian public sector, found the following points. “The *staff in administrative development and training are not qualified enough to perform their tasks and to assess training needs in particular”.* Moreover, a participating HR manager revealed that in his organization the numbers assessing each employee’s needs every year is limited. He justified this by the cost of programmes and the time required for T&D and also with the lack of T&D rooms or facilitators. With respect to this, the HR manager said*:*

‘Our organization does not have enough time and resources to assess our employees’ needs, thus, we choose a particular number of employees each time. The number of training programmes offered to each employee is limited, thus, I think training must be targeted towards those who really need it. We look forward to providing each employee with one T&D opportunity every year, but we cannot due to the lack of training rooms.’

One manager expressed a slightly different point of view than the others with the following statement:

‘If training needs are assessed properly, and training programmes are implemented and the right people are nominated for training, then I do not see that this could be a waste of money and time, rather I think this would be a long-term investment for the company, provided that the funds are available and enough.’ (Project manager)

Therefore, T&D should be based on the organizations' real needs; this facilitates the application or transferring process of the skills and knowledge needs gained into the workplace. In this context, one academic researcher stated:

‘I think it all starts from excellent TNA, thus if T&D programmes are built on real work needs this will make T&D more practical, easy to apply and useful in solving work problems’.

The biggest problem identified by participants was the lack of top management support and lack of expertise. However, one manager added to the difficulties that might arise in most Iraqi organization when he made the following comment:

'Lack of commitment, cooperation and support from all levels of management including top management, supervisors, as well as employees.' He also expressed their dissatisfaction.

'Lacking of commitment from top management leads to a lackadaisical attitude to training throughout the organization, including to TNA, which results in a half-hearted effort in doing the TNA. The success of TNA relies on the system/data available and on the full support from top management. We lack these two points'.

Further quotations from project managers were that, in our company *'planned training was always cancelled when there were more important work demands.'* As expected, other common difficulties faced were time and budget constraints. Some respondents mentioned that the budget allocated to training was inadequate and that they did not have enough manpower to conduct a proper TNA.

With respect to TNA methodology, performance appraisal appeared to be the best and in this context one academic stated that:

'Training needs should be assessed using scientific methods and based on employees' performance appraisal records. We need to know how to assess TNA accurately, how to nominate our employees and how to choose trainers.'

Another comment by an HR manager who also favoured the performance appraisal method for his company was:

'*A systematic review of the employees' current performance should be done based on their annual performance reports to determine their skill and knowledge levels. Accordingly, the organization knows who needs training on what, who had training but it has not changed his/her performance and why not, and who we do not need anymore*. "

A project manager mentioned weaknesses in common TNA methods that made them impractical for his company's use:

'TNA by traditional methods (questionnaire surveys, interviews, assessment centres) are time-consuming in nature. That is why we emphasize a practical approach more, namely on-site observations and SKAs tests.'

With respect to TNA techniques, all the experts paid attention to all TNA levels and that TNA should be at the organizational, task and individual level. In this context, one manager added the comment:

'In order to achieve a successful and effective TNA outcome organizations need to adopt all levels of TNA, otherwise the results will be poor. Regrettably, I must admit that our company pays attention to only one level of techniques in preparing training programmes for their employees and this is due to changes in the political and economic situation of Iraq.'

It seems that a lack of education in management skills within construction project management is one of the causes of the decline in the effectiveness of the Iraqi construction industry. After 2003 there was an urgent call for construction managers to spot the skills and knowledge shortage existing in their firms. This problem can be reduced by providing effective training and development programmes. With respect to skills and knowledge needs assessment, some experts considered that project management skills, technical skills and knowledge of management and administration of sites are very important, except for two of them. They claimed that multiples skills and knowledge are required by all employees and particularly by managers in construction companies; in this context, one of them stated:

'As with all employees, project managers should have multiple knowledge and skills needed to do their jobs. If managers lack these skills and knowledge, training is one option. So I think a good project manager needs all of these skills and knowledge.'

A further comment by an academic researcher who believed project management and technical skills are vital to the construction industry was that:

'Without any doubt, employees, particularly those who work as managers in the construction field and who are not knowledgeable about technical construction skills will not be able to perform their role successfully. In addition, undoubtedly, without a working knowledge of the management and administration of construction sites employees will be unable to acquire their project management potential'.

An additional statement by a project manager was that:

'A project manager with a combination of strong project management and technical skills and relevant knowledge and other important skills will be in a position of strength within their organization and a valuable resource.'

A general manager who suggested that further skills should be considered in construction stated that:

‘The most recognizable skills that I developed over the years of my project management construction experience are confidence and the ability to manage high levels of complexity, fast-moving situations and the ability to manage people. However, I certainly say that both managerial and technical skills are required by an effective project manager.’

Human resources considered a significant element for economic development. As it seems developing skills and knowledge of employees in Iraq and the other managerial behaviours have been influenced largely by socio-cultural factors resulting from Arab culture and Islamic rules, principles, and this could be barriers to apply any management development programmed. According to Altarawneh (2009)” *the Arab managerial style is characterised by over-staffing, over-centralisation, lack of qualified and educated managers, lack of long and short term planning of human resources, lack of a well organised and systematic training programmed and overemphasis on nepotism and social relations as a basis to get things and work done*.” Iraqi construction organizations need to pay attention to the importance of TNA as a strategic tool for individual and organizational growth. Thus, many steps need to be taken and many obstacles need to be overcome.

Participants were asked further questions about whether they support the notion that it is vital to develop the findings into a managerial checklist for practical application within Iraqi construction organizations. They were also asked to consider use of this study as a management worksheet by trainer developers in order to assess employee’s skills and knowledge. The feedback indicated overwhelming support for the potential application of the findings, which would be welcomed and beneficial *(ratings of important and very important in most cases).* It was also encouraging that participants, in general, agreed that there is the possibility of developing a toolkit for TNA purposes. The convergence in this study is positive and this can give some assurance that the model developed in this study is in congruence with reality in Iraq. Therefore, it might be recommended for assessing construction workforces and has the potential to be well received.

Table 6-1 Feedback from five experts with respect to potential recommended application

Themes (Variables) N = 4	Not very Important 1	Not Important 2	Average 3	Important 4	Very important 5
Do you agree that it is important to further develop these themes into a construction management training checklist for practical application in Iraq? Please circle the appropriate number				3	2
Would you consider it important for these themes to be further developed into a construction management training checklist, so that companies can use them as a guide for assessing and developing potential skills and knowledge needed for project managers for Iraqi construction firms?				1	4
Would you think it is important for the themes identified above to be further developed as a foundation for programme development, for the training of construction site engineering's employees in the management of construction s in Iraq?				2	3
Can you indicate your readiness to use the management training checklist if developed for practical application for construction firms?				3	2

Finally, respondents were asked to make their own assessments of the research findings and to offer suggestions on any other ways they thought the model could be applied for the benefit of the construction industry in Iraq. Some of them re-emphasized the potential for the findings to improve skills and knowledge in construction engineering in Iraq. There were some particularly interesting assessments which are worthy of note: For instance, one project manager wrote that:

'*These models are suitable for development of training needs programmes for prospective project managers and also to guide other shareholders such as property developers and governmental agencies'.*

A contribution from a general manager was:

'This model will help Iraqi construction firms to have a foundation to identify shortages of skills and knowledge that exist and identify the training needs of their employees very well and efficiently'.

To sum up; this model may face some challenges and drivers to implement the model in Iraq .Iraq are a country that is suffering from the effects of: decades of neglect of many essential and non-essential aspects of decent living; the run-down of infra-structure; wars, with the outside world. This caused it, and throughout the decades, to suffer from a continuous draining of essential good-society driving forces, on the levels of management, executives, scientific, experts, technicians and many other ranks of: industry, commerce, finance, economy, transport, medical, civil, construction, agricultural and other aspects of any modern country. Moreover, illiteracy (in the context of running everyday life-needs) is common.

Besides, there are many inherent features of its own inner society composition that exacerbated the effects of the above issues. Many parts of the Iraqi society are tribal and/or family-based type. Favouritism, partiality and bias are ripe, making many decisions taken by the plethora of politicians, and civil servants, skewed.

The weakness of consecutive governing authorities, in pursuing a firm judiciary system, meant that corruption would be a by-product of such atmosphere. The materialistic resourcefulness of Iraq, such as the vast reserves of oil and gas, compounded by the geopolitics, as well as, the onslaught of outside forces trying to influence decision-making process, lead to a society that is, moreover, intermingled with fast-money making forces.

The above picture tacitly means that there are not many properly researched studies about the ill-effects of industry, as a whole. Moreover, the situation has its own hallmarks that made it very difficult to compare it to other neighbouring countries, of a near-similar human composition, and/or resources.

Having said that, there is however, a societal potential that is a feature of the history of Iraq that makes it very resilient and able to kickback and '*rise from the ashes*', so to speak. The highly educated and resourceful, scattered around the world, expatriates, on the other-hand, together that ability of those still inside Iraq, make Iraq a country of extreme potential, in many respects.

This study is building upon such background. It tries to interrogate the existing forces that are already working in the construction industry, to try to understand, and then offer a model for of improving, part of the workings of that industry. It tries to pin-point gaps in the chain of workings of the construction industry, in particular, the training aspect. The study found that there are gaps in the preparation phase for training, an important improvement aspect of many industries. In particular, there were gaps in Training Needs Assessment TNA. The study could not find a reputable academic source covering any such study. This is, in the researcher's opinion, is due to multitude of issues mentioned earlier. One would not expect such highly precise studies, in such harsh and un-stable an environment.

But this raises an important issue. The author thinks that the findings of this study might face an uphill struggle, in trying to get it accepted and then taken on-aboard by the construction industry. Nevertheless, there are strong and powerful signs (or at least a very strong indicators) of economic improvement in Iraq, that makes this study an important and extremely relevant lever, in the process of such economic improvement.

6.4 Internal Validation

Internal validation was carried out on two levels, in particular at convergence between the literature and questionnaire analyses and convergence between the questionnaire analysis and academic validity. All through this process the concepts, methodology and findings of the study have been found to be realistically supported by the comprehensive use of literature in support of the study. The details are as follows:

6.4.1. Literature Search: Questionnaire Development

The use of validation of questionnaire development in this study is duplicated in connection with the literature search and the theoretical framework adopted in Chapter two. The variables adopted in this model are supported by the well-recognized organizational theory of TNA, and skill and knowledge for construction employees (Hassan *et al.*, 2005; Odusami *et al.*, 2007; Gunawardena & Jayawardane, 2002; Odusami, 2002; Odusami *et al*., 2007; Charlesraj *et al*., 2004; Brown, 2002; Jamil, 2006), therefore, the variables analysed had a logical theoretical bases on which to be included in the questionnaire. The design of the model was informed by an extensive literature review of construction industries and human resource management (Johnson *et al*., 2002).

6.4.1.1 Literature and Questionnaire Analysis: Model Validation

The findings from all three analyses in this study duplicated the literature. The independent and dependent variables of the model were identified and discussed under the various constructs which they represented in the conceptual model, namely: construction site problems; training needs barriers and drivers; importance of TNA; methods and techniques for conducing TNA, and skills and knowledge needs.

Construction site management problems (drivers of TNA)

The variables identified under this construct were: site management administration; poor communication; technical problems, and lack of skills and knowledge for repetitive construction works. Their convergence was discussed extensively in sections of Chapter two. Some cited works that supported the findings here are: Griffith & Watson, 2004; Trauner, 1993 and others works of significance are by George *et al*., 2007; Toor & Ofori, 2008; Tah & Carr, 2001; Kiwi Careers, 2002; Farrell, 1998; Odusami *et.al*., 2007).

TNA concept (barriers, indictors, methods and techniques)

The variables identified under this construct have in recent times become the focus of TNA in construction management research (Iqbal & Malik 2011; Gupta *et al*., 2007; Altschuld & Lepicki, 2010; Kaufman & Valentine 1999; Cekada, 2010; Kaufman 1994; Armstrong 1996; Tao *et al*., 2006). For example, it has been noted that there have been widespread research studies into the training needs of construction workers, such as site managers, and how needs assessment can affect the performance of a project (Hassan *et al* 2004; Marzouk, 2009; Goulding & Alshawi 2004).

Agnaia,(1996) also highlighted that needs assessment is important to the effectiveness of training. Recent studies, undertaken in the construction industry (Hassan & Stephenson 2005; Marzouk, 2009; Goulding & Alshawi 2004) also give significant support to the importance of TNA to construction. Methods and techniques have also received relatively intense research interest in recent times (Jamil & Som 2007; Goldstein & Ford; Hassan & Stephenson 2005). It is also vital to say again that the variables identified under this construct recognized convergence with the theoretical model, which has been previously broadly discussed in chapter two.

Skills and knowledge needs

Under this construct the variables have highlighted important skills and knowledge required by construction engineering. Recent studies undertaken in the construction industry (Odusami, 2002; Odusami *et al*., 2007; Charlesraj *et al*., 2004; Gushgari *et al*., 1997; Mulya *et al*., 2004; Hassan, 2009) paid attention to skills and knowledge needs of site managers and construction workforces. Farrell and Gale (2003) also gave significant support to findings that the fundamental skills needed to improve the performance of the construction industry, are those such as technical skills, human skills and conceptual skills. It is also important to show again here that the identified *skills and knowledge variables* provide evidence of convergence with the theoretical model, which has been discussed comprehensively in chapter two.

6.4.1.2 Convergence 2: Analysis of Questionnaire and Academic Validity

The research results of this study have been submitted to the well-reputed Salford Postgraduate Annual Research Conference (Sparc). A total of three papers were presented and discussed with audiences of different background. Some in the audiences provided some important comments in suggesting that the methodology (analysis) used needed to satisfy academic validity. The papers targeted so far are built environment. To support academic validity, the focal points of papers were on particular features of research findings. For instance, in the paper submitted to Sparc 2013, the key focus was on the aims of the research, which were to develop the model.

So a wide-ranging review of the literature was undertaken to define and clarify the scales and measures used in this research. Many items and scales used in this research were adopted from several studies, which placed an emphasis on meeting the requirements of validity and reliability. Sekaran (2003) asserted the need to use well-validated and reliable measures to ensure that the research is scientific. It can now be said that a TNA model developed for construction engineering workforces can potentially be used by practitioners in Iraqi construction firms. The following chapter will discuss the results of the research by providing a summary of the work carried out.

6.4.2 Criterion-Related Validity Test

For a criterion-related validity test, the correlation coefficient for each item of the group factors and the total of the field is achieved. The p-values (Sig.) were less than 0.01 for all results, so the correlation coefficients of each field are significant at á = 0.01, so it can be said that the paragraphs of each field are consistent and valid for measuring what they were set for. The results of the criterion-related validity tests can be viewed with more detail in tables in the appendix.

6.4.3 Structure Validity Test

The field's structure validity was assessed by calculating the correlation coefficients of each field of the questionnaire and the whole of the questionnaire, as shown in Table 6-3.

Table 6-3: Correlation coefficient of each field and the whole of questionnaire

No	Field	Spearman Correlation Coefficient	P-Value (Sig.)
1-	Construction site problems	0.842	0.000**
2	Training needs indicators	0.805	0.000**
3	Training needs barriers	0.713	0.000**
4	TNA methods	0.773	0.000**
5-	Criteria of Data Collection Methods	0.775	0.000**
5-	TNA techniques	0.684	0.000**
6-	Importance of TNA	0.771	0.000**
7-	Skills needs	0.797	0.000**
8-	Skills possessed	0.784	0.000**
9-	Knowledge needs	0.727	0.000**
10-	Knowledge possessed	0.609	0.000**

Table 6-3 explains the correlation coefficient for each field and for the whole questionnaire. The p-values (Sig.) are less than 0.01, thus the correlation coefficients of all the fields are significant at á = 0.01. As a result, it can be said the fields are, valid for measuring what they were set to achieve with respect to the key aim of the study.

6.5 Summary

This chapter has addressed the validation of the models developed in this study. Both external and internal validations have been described. In the external validation, the researcher approached experts and practitioners to assess whether the models correspond with reality. The findings reported are valid and can be generalised across construction projects in Iraq. Furthermore, when respondents were invited to share their opinions on these findings, they generally concurred; even where there was scepticism, this was not unanimous and therefore does not invalidate the findings.

Regarding internal validation, this study was undertaken at three levels, i.e., convergence between literature and questionnaire analyses' convergence between questionnaire analysis and academic validity, and convergence between academic validity and the literature search. During this process the concepts, methodology and findings of the research were found to be reasonably supported by the extensive use of literature in support of the study. It is therefore contended that the offered model has the potential for subsequent development and use by Iraqi specialists in construction industry. The next chapter will discuss the research objectives in more detail.

Chapter 7: Discussion

7.1 Introduction

The main driver for organizational success and better-quality performance is providing proper training programmes to employees. Training and development is the main strategy used by the construction industry at the current time to improve the capabilities and skills of its workforce. Research has demonstrated that properly trained employees are responsible for implementing organizational strategies, organizational assets represented by technology and meeting customers' needs by providing good quality products and services. Hence, more attention should be paid to training and development programmes in order to develop employee's skills and help them to perform their current and future duties to a high standard. In this study a TNA models for the engineering workforce in Iraqi construction firms has been developed. Consequently, the training needs gaps in the engineering workforce in Iraq have been identified. The previous six chapters have expounded the conceptual, methodological and substantive approaches used to address the research agenda.

The main aim of this research study, as noted in chapter one, is to develop models for assessing skills and knowledge needs in the Iraqi construction industry. Consequently a number of research objectives have been developed in order to collectively satisfy this aim. At this point, the research objectives are revisited to highlight the extent to which they were achieved through the various phases of the research. In this chapter the results that emerged from the data analysis presented in chapter four, will be discussed. It links with chapter 4 and also links the theoretical literature with empirical research. Interpretations and reflections of the quantitative results (Chapter 4) are presented, and comparisons with other related studies are made. The aim of this study has been accomplished effectively by addressing the research objectives as follows:

7.2 Findings Related to Objective One:

To conduct critical literature reviews on the theories and schools of thought relating to construction management, training needs assessment and the development of skills and knowledge.

This first objective was satisfied by undertaking an extensive review of recent developments in training and needs assessment for skills and knowledge in developed and developing countries. This objective was achieved by synthesising knowledge through a critical literature review (Chapter 2). The literature covered issues related to training in construction, i.e. the concepts and definitions of training, and the importance and benefits of training. The literature also revealed that very little attention has been paid to TNA in the field of construction. While there existed an acknowledgement of the contribution made by proper training in the construction industry of developing countries, a lack of detailed research on TNA in the context of the construction industry revealed. The literature review revealed reliable theories and models useful to establishing a model useful in measuring training needs assessment for the Iraqi construction industry (Chapter 2). This objective was therefore addressed by reviewing, in particular, the relevant literature on construction training and needs assessment for skills and knowledge. This led to the identification of the organizational theory of TNA practice as an appropriate methodology for addressing this research agenda.

This study has highlighted the nature of TNA in Iraqi construction and the skills and knowledge needs of their construction engineers. It has found that engineers must have not only technical skills and knowledge, but also managerial skills which are needed for the success of modern engineering projects (McConnell, 2004; Hasan, 2008). The literature indicates that in order to make companies competitive in the current market, they must also have competitive employees. Therefore, it is most important that skills and knowledge are kept up-to-date to help avoid project failure.

Generally speaking the construction industry is considered to be fragmented, where construction companies only pay attention to meeting the requirements of contractual needs. Since these companies represent different professions, including architecture, structural engineering, quantity surveying, civil engineering, project management and building surveying, their skill problems and knowledge gaps limit their performance. The problem of skills and knowledge gaps has a number of causes, such as a predominate engineering culture that only pays attention to technical skills and knowledge and neglects the managerial aspect, also there are some companies who are only interested in recruiting employees with skills and knowledge that they already possess (Cheng *et al.*, 2001). Skills and knowledge deficiencies in the Iraqi construction industry could have an impact on construction engineering companies in various ways, such as: in promoting a new product on the market, business development, the ability to meet customer demand, service and quality objectives, and operating costs (Hasan, 2008). Neglecting to close these gaps in skills and knowledge will lead to a negative impact on the business opportunities created by engineering employers in a competitive global market. The skills and knowledge gaps in the workplace need to be resolved. Therefore, there is a need to pursue the study of needs assessment for skills and knowledge amongst engineering employees in construction industry. This study aims to identify training needs for skills and knowledge in the Iraqi construction industry from the perspective of construction engineering employees.

A successful training program should begin with a TNA (Chapter 2); academic writers consider TNA to be a crucial stage in which training needs are identified. Bee and Bee (1994, p. 46) assert that '*assessing training needs plays a very important role in identifying individuals who need to be trained, designing programmes that relate to the needs of both individuals and the organization, allocating the required time, determining the programme objectives and the required skills and determining the required resources for implementing the programme'*. In order to make TNA more effective it should be based comprehensively on all three levels: analyses on the levels of the organization, tasks or jobs and personal needs; not just on one source of analysis. T&D should be based on the organization, jobs and the real needs of individuals.

In order to understand the whole of the TNA process in Iraqi constructions firms, participating construction engineers were asked various important questions regarding the following: construction site problems (drivers of TNA), regularity of conducting TNA processes, TNA methods or techniques, indicators to assess training needs and when employees received T&D, the importance of TNA and areas of skills and knowledge that the Iraqi construction engineering workforce need more training in.

7.3 Findings Relating to Objective Two:

To identify the drivers, indicators and barriers to conducting TNA in Iraqi construction organizations

7.3.1 Construction Site Problems (Drivers)

Construction companies are faced with a number of challenges that occur on construction sites. These problems can reflect on the performance of construction companies. Interestingly, (Chapter 4 section 4.4.7) provides some very useful descriptive statistics indicating that all groups (site managers, civil engineers, project leaders and architects) agree that site management administration problems are the most common problems they face. Hence, site management administration problems were the main drivers for TNA for all participants (see figure 4-6 in chapter 4). This might be due to the lack of training programmes provided by companies and institutions in the field of management for construction engineering workforces in Iraq and also due to a lack of awareness of the importance of management knowledge in construction projects. It appears that, management problems in construction projects seem very common in the Iraq construction industry. This is attributed to the recruitment and promotion of Iraqi managers, not based on merit, but rather on subjective criteria: loyalty to superiors, political and tribal affiliation, kinship and personal connections; this of course will put the wrong person in the wrong place. Moreover, the over-emphasis on academic qualifications, in the recruitment and promotion of employees, with little attention paid to work experience in public or private organisations, has produced poorly qualified and less capable people occupying managerial positions within organizations. Experience is essential, not only in understanding how organizations are managed in real situations, but also as a rich source of ideas for training material (Atiyyah, 1991; Griffith & Watson, 2004; Mohamed 2006). It was also found that there was a significant difference between Iraqi construction engineers in terms of construction site problems, as in Table 4-7 Chapter 4, which shows the ANOVA tests for independent variables; these show significant differences exist between construction site management problems variables.

7.3.2 TNA Indicators

In Chapter 4, Table 4-10 shows that the majority of participants stated that their organisations considered organisational performance problems and fulfilling their employees' developmental needs as the most important indictors to take into account when assessing training needs. This study found that the most common reason for the engineering participants to conduct TNA in their organizations was *'organisational performance problems'*. The next most common reason for conducting TNA was to *'fulfil their employees' developmental needs'*. This suggests that participants believed their organisations regarded performance problems as vital indicators and initiated TNA to identify possible training needs of employees in order to develop their potentials. This finding is consistent with that of Al-Athari (2000), who found that poor performance (92%) was the main indicator in public and private Kuwaiti organizations. This finding is interesting, as it appears that construction companies in Iraq are more likely to concentrate on performance issues rather than employees' developmental needs. Hence, it appears that construction companies do not pay more attention to developing employees' skills and keeping them up to date with any new development programmes. It was found that '*career development'* was the least stated reason for conducting TNA. However, previous studies have demonstrated that if organisations are serious about developing their employees, they should also consider *'preparations for unexpected changes in the future'* to be an equally important driver (Jamil, 2006). The findings of this survey reflect the real views on TNA in Iraq and their impact on an organization's performance where performance problems are not an indicator for assessing training needs; meaning that, when improving an organization's performance, it is nothing to do with training development. Unfortunately, it seems that Iraqi construction companies are not serious about developing their employees and are only concern about existing problems in their organization; this kind of TNA, known as reactive TNA, only focuses on performance problems that currently exist. Whereas, proactive TNA focuses on performance problems anticipated in the future and thinks about improving the employees' performance in future.

Table 4-9, Chapter 4, shows the output of ANOVA analysis and any statistically significant differences between group means. The significance level is 0.000 (p = 0.000), which is below 0.05, therefore, there is a statistically significant difference in the means of each training needs indicator variable between all the groups.

7.3.3 Barriers to Training Needs Assessment

There is emphasized that the effectiveness of TNA depends on the support of top management and an understanding of what the TNA hopes to achieve as well as its potential benefits. Here, it was found from the majority of the questionnaires, construction companies in Iraq do not take training needs issues seriously and fail to understand the purpose of TNA. Based on these findings, assessing the training needs of employees in Iraqi construction firms is ill defined and generalized rather than systematic. It was found in Table 4-12, Chapter 4, that all groups of construction engineers considered that a lack of support from top management, a lack of expertise and no proper job descriptions were the most common barriers to TNA, despite the fact that the support of top management is considered a significant factor for successful T&D programmes (Taylor 1996; Jones, 1990). According to Wagonhurst (2002), in order to determine and analyse needs accurately, TNA must be conducted by people with expertise. But, as shown in Table 4-12, Chapter 4, a lack of expertise was one of main barriers; this result concurs with other research by Agnaia (1996), who found that TNA in Libyan companies was not conducted by the 'right' individuals. Agnaia (1996) suggests that the problem of TNA practice not being proper or effective in Arab companies is due to the lack of relevant knowledge or qualifications possessed by the people put in charge of handling the companies' training and development functions. In another study, by Zakaria and Rozhan (1993) it was found that the lack of professional people to conduct TNA was the main reason for the failure of training programmes. He also found that of the 44 percent of the organisations involved in the study did not conduct any kind proper of training needs assessment. These findings give the impression that there is limited awareness of the theories of training in general and of TNA in particular in Iraq . Again, this only reinforces the conclusion that there are no specific or systematic practices or procedures for determining training needs in Iraqi construction companies. It can be presumed that managers and companies in Iraq are not aware of the benefits of TNA and that they do not consider TNA to be an important issue and this is, perhaps, due to a belief that TNA could be a waste of time. This is consistent with other studies (Altarawneh, 2010; Altarawneh 2009;

Al- Khayyat, 1998; Atiyya, 1993) that show TNA in Arab companies to be highly deficient and ill-defined. Furthermore, Abdalla and Al-Homoud (1995) found that there were no specific or systematic practices or procedures for determining training and educational needs, due to a lack of reliable information, turbulent politics and economics, and fast-changing social environments. In Iraq the economic, political and social situation places some constraints on these programmes. The major findings of this study are also consistent with Al-Ali (1999) as he reveals in his study about the Kuwaiti government and private organizations: that the majority of the investigated organisations do not have a formal training development system and T&D programmes are provided on an a bit-by-bit basis, rather than as part of a systematic long-term policy. Based on the findings, there is lack of effective expertise for evaluating TNA. Apparently, training needs assessment in Iraq faces many challenges and obstacles. According to HR manager participants who made comment that: '*Employees in Iraq view training needs programs as leisure or rest time from their jobs and responsibilities; moreover, they are selected to attend these programmes on the basis of their personal relationships rather than on their actual need*.' Table4-13, Chapter 4, shows that overall there were significant differences in TNA between all groups. However, in the cases of a lack of adequate expertise and a lack of employees' interest in a skills development programme, the P value exceeded 0.5; therefore, there were no significant differences between these four groups. On the other hand, for the rest of variables, there were significant differences between the four groups**.**

7.4 Findings Relating to Objective Three:

To explore the nature of existing TNA offered by Iraqi construction companies by identifying the levels of TNA and the data collection methods and techniques used at each level.

Based on company size, the survey participants were asked whether their companies conducted formal TNA or not, and if so, how often their organizations conducted TNA. Over half of the participants stated that their organizations conduct TNA on an ad-hoc basis and on a regular basis. Interestingly, no participant chose to answer 'never' (see table 4.7, Chapter 4). Therefore, Iraqi construction companies conducting TNA are not systematic in their analysis of T&D needs. They also only conducted TNA when they felt that there was a problem in their organisations and they were not conducted for development reasons. This implies a low level of maturity on the road from performance-driven T&D to more strategically developed HR departments in Iraq. Other research into T&D in small companies (Sadler-Smith *et al*., 1998; Vinten, 2000; Hill & Stewart, 2000) supports this finding with most TNA conducted when performance problems arise. It was also found that there was a significant difference between Iraqi construction firms in terms of whether they conducted TNA at all. Nadler (1990) stated that '*training needs should not only be assessed in the first step, since the T&D process is affected by a variety of environmental factors that could affect the whole T&D outcomes and results*'. As a consequence, training needs should be assessed at different stages and should be flexible enough to take any urgent T&D needs into account. This finding is consistent with other researchers' findings. For example: Albahussain (2000) found that just 42% of the large and 29% of the medium-sized Saudi organizations surveyed conducted TNA on a regular basis, with most of these organizations conducting TNA only occasionally. Altarawneh (2009) found that 77% of the participants in Jordanian banks agreed that their organizations conducted TNA on a regular basis. However, almost 16% of the participants asserted that their organisations conducted TNA occasionally and about 8% of them said that their organizations seldom conducted TNA. However, research has demonstrated that conducting TNA on a regular basis does not always mean that TNA processes could not be more effective. Assessing training needs once a year is not enough to establish effective TNA; they should be assessed at various times, depending on the organisation's needs and conditions (Altarawneh, 2009).

Overall, it was found that, to a certain extent, all methods of assessment were used by the companies involved in the study. However, respondents were asked to rate the extent to which their organisation had a preferred method. It was found (see Table 4-13, Chapter 4) that all groups of construction engineers prioritized appraisal of performance, as it represents the most popular and regularly used TNA method (mean = 4.25), followed by site observations (mean = 3.76). These two methods could help organisations to get very precise information on the skill levels, knowledge and behaviour of individuals in the workplace (Brown, 2002; Jamil, 2006). Thus, this finding gave credibility to that of Odusami *et al.* (2007) who argued that site field visits enhance not only the cognitive learning outcome, but have a significant impact on the effective domain of the learning. This finding also corresponds with Albahussain (2000), who found that field visits and observations were the most popular TNA methods used in surveyed Saudi organisations, followed by formal performance appraisal reports. Questionnaires were the least used, followed by personal interviews and specialist training committees. Whereas, Al-Athari (2000) found that field visits were the most popular TNA method used in public and private Kuwaiti organisations, followed by examination of performance. This finding is consistent with those of other researchers, whereby ‘the organisations regarded performance appraisals and employees’ level of performance as crucial aspects of decision-making concerning selection of training participants’ (Jamil, 2006). Another study also reported ‘performance appraisals and job performance reports as one of the predominant TNA approaches/techniques in Libyan companies’ (Agnaia 1996). Referring to Table 4-14 in chapter 4 comparing the employees who preferred the best methods for collecting TNA data, the study found no significant differences between groups in TNA: namely performance appraisal (0.819) and observations from on-site visits (0.15). For the remaining methods, there were significant differences between groups.

So, the findings of this study were expected, and perhaps not surprising, as performance appraisal has often been considered the most widespread and popular method of TNA for organizations (Brown, 2002; Jamil, 2006). However, as discussed in Chapter 2, the use of this method is full of dilemmas, and it has many disadvantages (Roberts 2002). Based on the findings of this study, Iraqi construction organizations rely heavily on this method to gather TNA data. This practice is not acceptable unless organisations meet certain criteria, as discussed in Chapter 2, in order to ensure that they do determine their training needs accurately. The criteria (see Table 4-15, Chapter 4) that have been selected in this study for data collection method preferences were considered by the organisations in this study. In order of importance, it was found that they considered the two most important criteria to be the availability of HR staff expertise followed by cost effectiveness. The remaining criteria considered by the organisations were: time required, top management preference and availability of facilities required. These findings correspond with previous research (Elbadri, 2001; Jamil, 2006) in that the choice of data collection method should fit the organisational culture and be accepted by its people. Effectiveness was also important and that is probably why the methods chosen had to be practical in terms of cost, time, energy and ease of use.

In terms of TNA techniques, the study results suggest that (table 4-16, Chapter 4) PEST analysis was the preferred technique used by construction companies to analyse organizational needs. However, this technique was only used ‘seldom’ by the organizations (38.9%) followed by ‘frequently’ (26.0%). It seems that the other organizational level techniques listed in the questionnaire were also rarely used by organisations, implying either, that they did not analyse training needs at the organisational level always or frequently enough, or that they were just not familiar with the techniques. Job analysis and performance reviews/appraisals were the most common techniques used by organizations to analyse their operational-level and individual-level needs, respectively. However, these techniques were used less 'seldom' and more 'rarely' as shown in Chapter 4. The literature indicates that assessment of training needs should be comprehensively carried out and considered based on all levels: individual, job and organisational. These assessments are fundamentally about which organisational area training is required in (organisational analysis), who is eligible for training and the kind of training that should be provided (individual analysis), and for which job or task training is needed (job analysis). Job analysis is about collecting, recording, tabulating and analysing duties and tasks and identifying employees' required competencies to perform their jobs. Job performance standards, knowledge, skills and abilities essential to perform these tasks are also identified (Altarawneh, 2009; Sherazi *et al*., 2011).

Unfortunately, respondents declared that their companies were not paying much attention to each level of analysis (Chapter 4). No single organization in the private or public sector used organizational analytical techniques frequently or always. More surprisingly, construction companies in Iraq also did not attend to the three levels of TNA or comprehensive TNA practices before conducting training programmes, despite the fact that this is recommended in the literature to achieve better training outcomes. Based on these findings it can also be understood that TNA techniques described in Iraqi construction firms are highly subjective because they depend mainly on what companies think about their employees' training needs, rather than on what performance appraisal records or employees' job descriptions show. Attention is only paid to organisational analysis; neglecting the other two levels (see Chapter 4 for data analysis of findings on TNA techniques).

7.5 Findings Relating to Objective Four:

To determine the level of importance of TNA outcome in the Iraqi construction industry

Eight statements were provided to determine the respondents' perceptions of the importance of TNA to their respective organizations. Based on the mean values for each statement, it can be concluded that perceptions of the effectiveness of training practice outcomes are high (Table 7-1). The majority of respondents strongly agreed that the TNA process could lead to effectiveness in their organisations' training practices, followed by meeting training costs and organisational goals. This finding agrees with the results from most other studies discussed in Chapters 2 (Agnaia, 1996; Gray *et al.*, 1997; Erffmeyer *et al.*, 1991) which report the importance of TNA to the success of training programmes.

Regarding the hypothesis test, on the basis of the independent t-test, the null hypothesis of independence was not rejected for the statement: '*training effectiveness may be achieved through effective TNA'*. As indicated, there seems to be a small difference (see table in appendix 8; the p-value is found to be > 0.05, 0.923). Hence, this hypothesis is not rejected; in conclusion there is no difference of opinion between the four principal actors on training effectiveness being achieved through effective TNA. This finding corresponds with previous research (Agnaia, 1996). Training effectiveness is obviously influenced by the success of the TNA. This is due to the significant role that needs assessment might play in identifying individuals who must be trained, designing training programmes that relate to the needs of both individuals and organizations, outlining the time required and determining the objectives and skills required; all of which lead to improving the effectiveness of the training.

As for the training cost statement the p-value was 0.608, which is greater than 0.05 hence, there was no significant difference in the distribution of values between groups. Therefore, the alternative was not accepted because p = 0.608, which is greater than 0.05 (listed in appendix 8). Hence, this hypothesis H0 is not rejected. In conclusion there will be no significant difference in the perception of the four principal actors in a construction project regarding the importance of TNA in identifying training needs. Therefore, by administering training only for the identified needs makes it cost effective. The findings relating to this statement are also consistent with other research studies (Hassan & Stephenson, 2005; Snyder, 2004) which show that TNA could also be time-saving, as well as leading to the benefits of good value training. It also helps to reduce the effort used in setting up training and avoids wasteful duplication (Iqbal, 2010).

Regarding the organisational goals statement, the p –value was 0.175 which is greater than 0.05 (appendix 8). Therefore, no significant difference was found between all groups in terms of their opinions. The null-hypothesis of independence was not rejected and the alternative is not accepted. Hence, this hypothesis H0 is not rejected. In conclusion there will be no significant difference in the perception of the four principal actors in a construction project regarding the importance of TNA in identifying training and non-training needs that should be used for setting training goals and organizational goals respectively. This result concurred with other research findings: if TNA is properly carried out, then effective human resource development interventions will contribute towards the attainment of organizational goals; it is like a road map for reaching those goals (Iqbal, 2010). This notion has already been confirmed (Desimone *et al*., 2002; Tao *et al*., 2006; Bowman & Wilson, 2008) and TNA '*can be performed if goal setting is considered as its one of the most important parts'* (Mathews *et al*., 2001). For the rest of the statements (Table 7.1) the p-value is less than 0.05 which indicates there was a difference among different engineers groups.

Table 7-1: Importance of TNA

Statement of TNA	Mean	P-value
Training outcome effectiveness improvement	4.71	**0.932**
Training cost reduction	4.30	**0.608**
Achieving organizational goals	4.22	**0.175**
Skills and knowledge improvement	4.14	0.00
Motivation of employees	3.85	0.00
Career development	3.83	0.00
Professional development of workforce	3.52	0.04
Managing change	3.21	0.06

7.6 Findings Relating to Objective Five:

To investigate the actual skills and knowledge the site engineers possess and what skills are needed to meet the changing demands of the industry.

The gap in skills and knowledge between actual and needed used as a basis to identify the training needs to suit Iraqi construction site engineers**.** There are certain important basic skills and knowledge that construction professionals are expected to possess. These are better learned at academic institutions; preferably at tertiary institutions (Chan *et al*., 2002). They must be placed in an appropriate educational framework to ensure their continuing relevance. With recent developments in the industry and the recent explosion in information technology, academic institutions are finding it almost impossible to disseminate all the available information and skills relevant to these professions. Traditional training and education models currently in use are often criticized for the lack of coordination between the needs of industry and the actual training/education delivered (Alshawi *et al.,* 2007). This dichotomy is often characterized as a 'skills and competence gap'. In this study the actual skills and knowledge possessed by construction employees were investigated as well as the skills and knowledge needed to meet the changing demands of the industry.

The benefits of skills and knowledge to the industry and the need for them are well recognised (Constable, 1988; Whetten & Cameron, 1991). Also, an appropriate body of skills and knowledge is fundamental, not only in demonstrating competence, but also in promoting a professional image for the construction industry (Egbu 1994). But what is meant by skills and knowledge? Constable (1988) defines a skill as 'the ability to perform a job to a prescribed standard', while knowledge is seen as 'the received concepts, ideas, theories, schools of thought and even traditional wisdom about management functions and problems'.

The lack of training of construction engineers within the Iraqi construction industry was found to be evident and most of the training provided was not comprehensive or effective. Even when training needs assessment was conducted, it was often varied and in most cases very ad-hoc. Project management was viewed as the most important skill by all engines groups; project management had the highest number of responders, followed by technical skills. In terms of the skills actually possessed, project management was least possessed by all groups, followed by interpersonal skills. It can be seen in Table 4-25 and 4-26, Chapter 4, that the training needs gap is not the same for each skill; this was perceived by all the groups in this survey. The training needs gap was relatively large for project management skills and interpersonal skills when compared with other skills. These areas, therefore, need more attention from a training point of view. The training needs gap was least with respect to conceptual skills, followed by enterprise skills. The majority of the engineers agreed with the question that was developed to investigate their training needs in terms of project management and interpersonal skills in the construction industry**.** There were also found to be no significant differences between the different groups with respect to their ratings of the importance of these two skills (project management p value = 0.350; interpersonal skills p value = 0.298; to what extent do they possess project management skills, p value = 0.535;

interpersonal skills, p value = 0.142). As for the remaining skills there were significant differences between groups, as shown in the appendix chapter (see appendix 9 and 10 Tables 9.1 and 10.1).

It appears that project management skills are increasingly recognized in Iraq and therefore, urgently needed by Iraqi construction companies, due to their important role in the success of construction projects. Iraqi construction companies need to create more awareness of the benefits of project management skills, techniques and processes. Engineers should also be exposed to project management skills and other skills as an intrinsic part of their professional curriculum, so that engineering graduates are well versed managerially as well as technically. This will allow them to contribute more effectively to the growth of the Iraqi economy.

The data presented in Chapter 4 in section (4.5.8**)** shows that the training needs gap is not the same for all areas of knowledge. It was found that all groups of engineers rated knowledge of site management administration as the most important needed, with a high mean score of 4.78; this was followed by construction technology, which had a mean score of 4.54. However, the knowledge least possessed was also found to be in the area of site management administration, with the lowest mean score of 1.40, followed by on-site construction processes, with a mean score of 1.87. This shows that the training needs gap is not the same for each area of knowledge, and this was perceived by all the groups studied in this survey. Clearly, the training needs gap was relatively large in terms of knowledge of site management administration and construction site process. These areas, therefore, need more attention from the point of view of training. The p value determined for the importance of knowledge variables and to what extent important knowledge was possessed was less than 0.05. Hence, we can say that there were significant differences between all construction groups, as shown in the appendix chapter (appendix 11 and 12; Tables 11.1 and 12.1). This suggests that the training needs gap in construction engineering is relatively large in the area of site management administration, followed by on-site production processes. These areas, clearly, need more in terms of training. The training needs gap was least in the knowledge area of design, followed by quantity surveying. So the results of the survey demonstrate that for construction engineering workforces in Iraq project management skills are the most valuable for the efficient and effective management of construction projects, followed by interpersonal skills and technical skills. The data also indicated that knowledge of site management administration is the most needed in terms of training, followed by knowledge of on-site production processes. These findings contradict those of similar studies conducted in more developed nations where these skills are prioritized. It is important to note the three skills perceived to be the most important by construction engineering workforces in Iraq. These areas of skills and knowledge represent key deficiencies that should be addressed with proper training programmes in future construction management development aimed at the Iraqi construction industry. Training programmes are likely to be required to be highly adapted to suit different construction employees due to the fact that the skills and knowledge gaps differ significantly between them. Cleary, there are areas of deficient skills and knowledge that are evident in the Iraq construction industry, particularly the areas of project management, interpersonal skills and knowledge of site management and on-site construction processes. The majority of respondents considered there to be a gap between the skill of their current workforce and the skills needed to meet their business objectives. The nature of these gaps mirrors the lack of institutions and organizations in Iraq providing developmental programmes with more than just practical and technical skills; this shortage could reflect on the performance of engineering employees in terms of their ability to meet customer service, quality and operational objectives (Connor *et al.*, 2000).

It can be understood from the results of the skills and knowledge assessment illustrated in Chapter 4 in section (4.5.8) that Iraq has an engineering culture which focuses mostly on technology instead of people and is rather disorganised in terms of staff development. Therefore, construction project management skills are very poorly represented amongst employees even though they are recognized to be important to construction projects (Ford *et al*., 2000; Loosemore *et al*., 2003). The construction sector in Iraq suffers from a deficiency in the right calibre of management generally and a lack of proper construction project management in particular. This is due to the dissemination of a culture of concentrating on the development of technical expertise, not paying proper attention to the advancement of individuals' aptitudes and not improving the construction knowledge-base as a whole. This can be attributed to the: sanctions epoch as well as the indifference of top management to engaging with improvement exercises or taking them seriously enough. In addition, tribal factors that interfere with the assessment of employees' needs, due to favouritism, play a negative role in the recruitment of personnel for the purposes of training and general skills improvement. Even though there are some educational institutions and various training institutions existing in Iraq, there is still an absence of sound competiveness in local Iraq training institutions when compared to other countries. According to one project manager, '*The educational system in Iraq tends to stress memory development rather than initiative in intelligence'* they have had little impact on developing the quality of employees' skills and knowledge that suit and meet the industry demand: '*The impact of socio-cultural factors'*. These factors create an individualistic approach, a preference for working alone rather in a team and a non-professional attitude to business; these have a real impact on the development of knowledgeable and skilled people. One of the issues that emerged from these findings is that the TNA approach is totally neglected in developing countries and in fact, T&D is not taken seriously in many Arab organizations, predominantly in the governmental sectors. Thus, the benefit of T&D is undervalued or not appreciated enough to develop people's skills and knowledge. T&D is viewed in Arab organization as a waste of time and money (Al-Humoud, 1989; Abu-Doleh 2004; Seethamraju & Agrawal, 1999; Haas *et. al*., 2003; Glover *et al.,* 2003; Goodrum *et al.*, 2007; Wang, 2008; Liska *et al.,* 2000; Farooqui *et al.,* 2008).

7.7 Findings Relating to Objective Six:

To develop a conceptual model or models that integrate the research findings of the training needs of employees in selected construction organizations in Iraq.

The justification for these models comes from the rising interest in improving skills and knowledge of employees in construction in general, and in Iraq in particular, as a means to develop, improve and upgrade the skills and knowledge of employees in construction in order to achieve the required level of effectiveness which is necessary for Iraq to remain competitive in the region. A shortage of skills and knowledge in construction also motivated the researcher to undertake this study and develop models that help to identify the skills and knowledge gaps in the Iraqi construction industry.

The highly educated and resourceful, scattered around the world, expatriates, on the other-hand, together that ability of those still inside Iraq, make Iraq a country of extreme potential, in many respects. This study is building upon such background. It tries to interrogate the existing forces that are already working in the construction industry, to try to understand, and then offer models for of improving, part of the workings of that industry. It tries to pin-point gaps in the chain of workings of the construction industry, in particular, the training aspect. The study found that there are gaps in the preparation phase for training, an important improvement aspect of many industries. In particular, there were gaps in Training Needs Assessment TNA. The study could not find a reputable academic source covering any such study. This is, in the researcher's opinion, is due to multitude of issues mentioned earlier. One would not expect such highly precise studies, in such harsh and un-stable an environment. Identification of training needs helps Iraqi companies to conduct successful training, whereas recognising non-training needs helps make management decisions regarding solutions other than training. Therefore, based on a review of the relevant literature we propose a model (see models in chapter 5). This model, which is descriptive in nature, is aimed at investigating the backgrounds of TNA that close skills gaps when practiced in construction companies. Drawing from the TNA theory and from skills and knowledge in construction a robust conceptual model was developed reflecting the trigger event for needs assessment in the input phase of the model. The organizational level, task level and individual level were integrated into the input phase of the model, then we identified the skills and knowledge required by the engineers in the process phase of the conceptual model, before finally reflecting the training needs as the output (see figures in chapter 5). Bailey (1987) argues that the development of an appropriate conceptual model is the key to identifying the relevant research methodology. The identification and appropriate development of the conceptual model helps to smooth the way towards fulfilling the objective. It was argued that, given TNA and skills needs (as evidenced in the literature) are often stable and continuing over time, the functioning measures involved can to a reasonable extent be assumed to be subjected to quantitative laws/logic. Consequently, in order to help establish the necessary convergence with similar studies on TNA, skills and knowledge, positivism was adopted as the primary research concept that influenced the design of the research instrument. Therefore, the construct from the TNA theory was used and recent construction management literature relating to training and skills and knowledge needs was also comprehensively drawn on. These measures represented the independent variables of the models. It was very important to identify a large number of variables relating to TNA practice, skills and knowledge in construction management. It was essential in this research to ensure that all the possible variables had been accounted for. Based on these independent variables, a research tool in the form of a questionnaire survey was developed. The questionnaire was piloted in Iraq and the UK by drawing on the expertise of 10 professionals experienced in the field of construction. Suggestions made by the respondents were included to improve the quality and suitability of the research instrument. Three types of statistical analysis exist: univariate analysis, bivariate analysis and multivariate analysis. Figure 3-11, Chapter 3, provides clear details of the design of the statistical analysis used in this research. Descriptive statistics, independent t-test and frequency distributions - are carried out. The reason for this is to try to understand what the data collected could offer in terms of information; by interpretation and using the findings of the quantitative technique, a clearer picture of reality is achieved. An Analysis of Variance (ANOVA) test is also carried out. The reason for using this technique is to analyse and compare the views of the various groups of construction engineers, in relation to issues of management on construction sites. Above all, the findings obtained from models emerged reasonably convincing and were supported by the literature (see for instance Odusami, 2003). These models adopted in this study help Iraqi construction companies to identify the areas in which the lack of knowledge or skills is most significant for the Iraqi construction engineers .However, each groups showed different findings of the skills needs and knowledge needs for construction engineers (see chapter 5, key finding for each groups). The findings come from models proved that there is a lack of project management skills and knowledge of site management administration within the construction industry in Iraq. Here, the training needs gap was found mostly to exist in the areas. These models will help Iraqi construction companies to have a foundation to identify shortages of skills and knowledge that exist and identify the training needs of their employees very well and efficiently.

7.8 Findings Relating to Objective Seven:

To test, refine and validate the model for assessing training needs in the Iraqi construction industry.

The last objective in this study was fulfilled by using external and internal validation measures. External validation involved the calculation of the mean absolute percentage error of the residuals as reported in chapter six. Both computations revealed that the predictive accuracy of the model was robust and thus could be generalized. As part of the external validation an agreement of 5 expert practitioners' points of view was also measure in Iraq to help the potential relevance of the intended application of the model. Internal validation engaged the triangulation of convergence among different sources of information consisting of the literature search and analyses of the questionnaire. Academic validation was established through publication of the research findings at University of Salford conferences. The convergences of the three resources of information help the researcher to supply evidence of the validity of the findings.

7.9 Summary

In this chapter, the findings from four groups were discussed in the light of the literature reviewed in chapter two. This chapter has highlighted the importance of TNA as a vital step if any training programme were to achieve its objectives. The study found that Iraqi construction companies did not approach TNA systematically, conducted it poorly and based it on only one level, neglecting the other levels of needs assessment. This is known as a standalone process of conducting needs assessment. According to the literature, when assessing training needs, individual, job and organisational needs should all be considered. This unsystematic TNA approach in the Iraq construction industry is probably due to difficulties and problems, such as: a lack of expertise and support from top management. Table 4-9 for site management problems and 4-11 for training indicators, show the output of ANOVA analysis and any statistically significant differences between group means. The significance level is 0.000 (p = 0.000), which is below 0.05, therefore, there is a statistically significant difference in the means of each training needs indicator variable between all the groups. Referring to Table 4-14 in Chapter 4, comparing the methods preferred by employees for collecting TNA data, the study found no significant differences between groups in TNA: namely performance appraisal (0.819) and observations from on-site visits (0.15). For the remaining methods, there were significant differences between groups. The Scheffe post-hoc test recognized that statistically significant differences were found between all engineering groups (see appendix: 2, 3 and 4).Based on the findings from the construction engineering groups, it could be said that there are areas of deficient skills and knowledge which are evident in the Iraq construction industry: particularly the areas of project management, interpersonal skills, and knowledge of site management and on-site construction processes. The majority of respondents considered there to be a gap between the skills of their current workforce and the skills needed to meet their business objectives. The nature of these gaps mirrors the lack of institutions and organizations in Iraq providing developmental programmes with more than just practical and technical skills. This chapter could be concluded by saying that this study has explored many new facts about TNA practice and skills and knowledge needs in Iraqi construction companies; it raises many other questions which need to be answered and which represent directions for future research. The next chapter will describe the achievements of the research aim and objectives. The limitations of this research, its contributions to knowledge and recommendations for future research in the Iraq construction industry will also be addressed.

Chapter 8: Conclusions, Recommendations, Contributions to Knowledge and Limitations

8.1 Introduction

This is the final chapter of the thesis in which the conclusions are drawn. This chapter sums up the main conclusions reached as a result of this study and reassesses the evidence collected to meet the research objectives (Chapter 1). Also, in this chapter recommendations are given, and the major contributions of this research to both academic and managerial practices outlined. In addition, the implications of the results, for interested T&D professionals, are discussed. Finally, there is a discussion of the limitations of this study, followed by suggestions as to the future direction of the research.

8.2 Conclusions

This study presents integrated models for training needs assessment to effectively assist Iraqi construction organizations their needs for skills and knowledge. Training needs assessment in Iraqi construction companies has almost the same characteristics as in other companies in developing countries; especially in Arabic countries. In this study a pressure response model TNA for the Iraqi construction industry is developed deductively, through a literature review (chapter 2). The model comprises of four elements: a trigger event (treated as a driver), an input, a process and an output. Each of these was examined in light of the findings given by survey monkey.

At this point, it is worth recalling that this study was descriptive in nature and conducted on Iraqi construction organizations with the aim of assessing the training needs of construction engineers. The aim of this research study was to develop a model that would help to assess training needs in the Iraq construction industry. The rationale for conducting the research was the need for a well-defined model for assessing construction engineering employees' skills and knowledge, thus improving performance on the construction site. The aim was achieved through several specific objectives including:

1. To conduct critical literature reviews on the theories, frameworks and schools of thought relating to construction management, training needs and the development of skills and knowledge.
2. To identify the drivers, indicator and barriers to conducting TNA in Iraqi construction companies.
3. To explore the nature of existing TNA offered by Iraqi construction companies. Therefore, this study will try to identify the different levels of TNA and the data collection methods and techniques used at each level.
4. To determine the level of importance of TNA practices in the Iraqi construction industry.
5. To investigate the actual skills and knowledge site engineers possess and what skills are needed to meet the changing demands of the industry.
6. To develop a conceptual model that integrates the research findings regarding the training needs of employees in selected construction organizations in Iraq.
7. To test, refine and validate the model in terms of assessing training needs for construction projects in Iraq.

Based on the analyses of the quantitative data presented in Chapter 4 and discussed in Chapter 7, the following summary of the main findings and conclusions was derived:

1. To conduct critical literature reviews on the theories, frameworks and schools of thought relating to construction management, training needs and the development of skills and knowledge.

The review of existing literature on TNA practices identified many problems in construction projects such as a shortage of skills and knowledge. The literature review revealed reliable theories for establishing a model useful in measuring training needs assessment for the Iraqi construction industry (chapter two). This objective was therefore addressed by reviewing, in particular, the relevant literature on construction training and needs assessment for skills and knowledge. This led to the identification of the organizational theory of TNA practice and skills and knowledge as an appropriate methodology for addressing this research agenda.

2. **To identify the drivers, indicator and barriers to conducting TNA in Iraqi construction companies**

To start with drivers, problems that face construction site management in Iraq can reflect on the performance of construction organizations and this could be a trigger event for considering for TNA. Interestingly, figure 4-6 in Chapter 4 provides some very useful descriptive statistics indicating that all groups (site managers, civil engineers project leaders and architects) agreed that site management administration problems are the most common problems they face. Hence, site management administration problems became the main drivers for TNA for all participants (see figure 4-6 in chapter 4). This might be due to the lack of development training programmes provided by companies and institutions in the field of management for construction engineering workforces in Iraq, but also due to a lack of awareness of the importance of management knowledge on construction projects. It was also found that there was a significant difference between Iraqi construction engineers in terms of construction site problems. This can be seen in chapter 4, which shows the ANOVA tests for independent variables; they show significant differences exist between construction site management problem variables. As for TNA indicators, it was shown in Chapter 4, Table 4-10 that the majority of participants stated that their organizations considered organizational performance problems and fulfilling their employees' developmental needs as the most important indictors to take into account when assessing training needs. This study found that the most common reason for the engineering participants to conduct TNA in their organizations was *'organizational performance problems'*. The next most common reason for conducting TNA was to *'fulfil their employees' developmental needs'*. This suggests that participants believed their organizations regarded performance problems as vital indicators and initiated TNA to identify possible training needs of employees in order to develop their potentials. Table 4-11, Chapter 4 shows the output of ANOVA analysis and any statistically significant differences between group means. The significance level is 0.000 (p = 0.000), which is below 0.05, therefore, there is a statistically significant difference in the means of each training needs indicator variable between all the groups.

One of the main barriers to TNA in Iraqi construction organizations is a lack of support from management and a lack of expertise, irrespective of the size of a firm (see table 4-12 in

Chapter 4). This has been endorsed by other studies (Anderson, 1994; Sadler-Smith *et al*., 1998; Heraty & Morley, 2000; Elbadri, 2001; Budhwar, *et al*., 2002; Hansen, 2003; Hill & Stewart, 2000; Hill, 2004). This is due to the lack of relevant knowledge or qualifications of the people put in charge of handling the companies' training and development functions. Table 4-13, Chapter 4, shows that overall there were significant differences in the TNA barriers between all groups. However, in the cases of a lack of adequate expertise and a lack of employees' interest in a skills development programme, the P value was exceeded 0.05; therefore, there were no significant differences between the four groups. The data used in the Cronbach's alpha reliability coefficient tests were derived from four groups (site managers, civil engineers, project leader engineers, and architects). It was very important to compare the mean values from these groups, using analysis of variance (ANOVA) at a 5% significance level. ANOVA, according to Field (2009, pp. 348 & 350), '*is a statistical tool used in analysing situations when there are more than two conditions to compare'*. Therefore, it is a method of comparing the ratio of systematic variance to unsystematic variance in a study. The ANOVA was conducted for site management problems, training needs assessment indicators and training needs barriers, and it only indicated whether there was a difference in the means of the variables and not where the differences lie, a further test was therefore required. The researcher was only interested in exploring the data for any differences between groups, when considering the mean values. Post hoc comparisons were conducted and found that exactly the same differences lie between groups (see appendix's 2, 3, and 4).

3. **To explore the nature of existing TNA offered by Iraqi construction companies. Therefore, this study will try to identify the different levels of TNA and the data collection methods and techniques used at each level.**

Results suggest that TNA in Iraq is conducted mostly on an ad-hoc basis, meaning that TNA is conducted only if a problem occurs in an organization. This study also suggests that the main driver for carrying out TNA is poor organizational performance. This can be interpreted as construction organizations not paying attention to the development of employees' skills with their focus being solely on the performance of the organization. This can only lead us to conclude that TNA in the Iraq construction industry is reactive and concerned with only existing problems, rather than proactive and concerned with the future improvement in the performance of the organization and employees. It was also found that there were significant differences in TNA practices between companies in terms of the competency analysis techniques used. This study provides some different results on effective training outcomes. This is mainly due to the finding that Iraqi companies do not approach TNA comprehensively; they only pay attention to TNA on one level, the organizational level, and neglect the others; that is according to the points of view of the respondents (Chapter 4, Table 4-16). As a result, Iraqi training programmes are poor and subjective in nature. Significant differences were found to exist between the groups of construction engineers, in terms of the methods used to practise TNA, except in their use of performance appraisal. The criteria that have been selected in this study for data collection method preferences were considered by the organizations in this study. In order of importance, it was found that they considered that the two most important criteria were: firstly, the availability of HR staff expertise and secondly, cost effectiveness (Chapter 4, Table 4-15).

4. **To determine the level of importance of TNA practices in Iraqi construction industry.**

The majority of respondents strongly agreed that the TNA process could lead to effectiveness in their organizations' training practices, followed by meeting training costs and organizational goals. This finding agrees with the results from most other studies discussed in Chapters 1 and 2 (Agnaia 1996; Gray *et al.*, 1997; Erffmeyer *et al.*, 1991) which report the importance of TNA to the success of training programmes. No significant differences were found between all the groups with respect to these three ideas: training effectiveness, training costs reduction and organizational goals achievement; the null-hypothesis of independence was not rejected for these statements. For the rest of the statements there was no difference.

5. **To investigate the actual skills and knowledge the site engineers possess and what skills are needed to meet the changing demands of the industry.**

This study highlighted the nature of engineering work in Chapter 2, section 2.31. It was illustrated that engineers must have technical skills and knowledge but cannot reject the idea that managerial skills, such as: project management skills, interpersonal skills and enterprise skills are needed for the success of engineering projects (McConnell, 2004; Hassan, 2008). The literature has described that to bring a company into the completive market both technical skills and managerial skills, such as: interpersonal communication skills and project management skills, are required to be up-to-date with the latest progress of a project. Thus, the awareness of the importance of these skills and knowledge can help to avoid project failure in construction. Therefore, supported by the literature for workplace requirements, construction engineers today must possess both technical skills and managerial skills. As explained in Chapter 1, the construction industry in Iraq is largely low technology, low skilled, low knowledge-based; training is vital to organizations in order to equip employees with improved knowledge and skills. This study identifies the areas in which the lack of knowledge or skills is most significant for the Iraqi construction industry. This research confirms that there is a lack of project management skills and knowledge of site management administration within the construction industry in Iraq. Here, the training needs gap was found mostly to exist in the areas of project management skills and interpersonal skills, as well as in the areas of knowledge of site management administration and knowledge of on-site production. This study gives a background to the construction skills crisis in Iraq and can be attributed to insufficient training programmes. Consequently, training needs are an essential issue to Iraqi construction companies. These findings reflect the reality of the local construction industry in Iraq and will help fill the skills and knowledge gap for Iraqi construction firms.

6. **To develop conceptual models that integrates the research findings of the training needs of employees in selected construction organizations in Iraq**.

The models identified three levels in the TNA input phase, namely: *organizational level, task level and individual level* which were integrated into the first phase. The models then identified the skills and knowledge required in the process phase and reflected the training needs as the output (see models in the chapter 5). The identification of an appropriate development of the conceptual models helps to smooth the way towards fulfilling this objective. In general, all the experts agreed that this study of TNA for the Iraq construction industry could provide good models to assess employees' training needs reinforce the concept of competency-based training and simplify the analysis stage of a planning process for training for both private and public companies in Iraq construction industry. These models will help Iraqi construction companies to have a foundation to identify shortages of skills and knowledge that exist and identify the training needs of their employees very well and efficiently. These models are suitable for development of training needs programmes for prospective managers and also to guide other shareholders such as property developers and governmental agencies'.

7. **To test, refine and validate the model towards assessing training needs in the Iraqi construction industry**.

Based on the validation exercise, predictive accuracy suggests that the findings could be generalised with respect to TNA in the Iraq construction industry. A consensus was reached by experts namely: project managers, HR managers and construction academicians on the potential relevance of the model in the Iraqi construction industry. There was an indication that the intended application of the model is in congruence with reality and could serve a useful purpose if it were to be applied in practice.

Based on the findings, the study concluded that the most common methods by which employees were chosen to attend training were based on the indications from a job performance review and site visit observation. Assessing training needs mostly by performance reports does not always reflect the true picture and the reality needs of employees in Iraqi construction companies, because they may be unclear, or may be subject to family, kinship and friendship ties in Iraq. What is more, the experience of the researcher also indicates that in Iraq employees are often sent abroad for training without a proper needs analysis being conducted before sending them. It is obvious that the selection of training needs assessment in Iraqi construction companies did not include any direct communication between training units and the employee's needs, since the practical techniques personal analysis , which concern the employees needs directly were very neglected by most of the companies. In addition, approaches that are recommended by many researchers (Altarawneh, 2009; Sherazi *et al*., 2011) such as analysis of organisation, operation and individual were not conducted by the Iraqi construction companies.

So, it can be said that TNA in Iraqi construction companies were not systematic and conducted comprehensive. TNA is poorly presented based on one level which is organisational and neglecting other levels .Furthermore, TNA did not conducted frequently in Iraqi construction companies, and it is only conducted when there is organisation performance problems. TNA did not conducted for assessing employees needs in Iraqi construction companies, and this could be due to lack of top manager's awareness of employee's skills development or lack of expertise in conducting TNA. Therefore, frequent needs assessment of site engineers should be viewed as important and encouraged, resulting in an end to the problem of a skills and knowledge shortage. There is evidence that there is common agreement that the training needs of construction engineering workforces should address project management and interpersonal skills, knowledge of management of sites and construction production site processes. Construction engineering workforces in the survey considered TNA to be very important in achieving effective training outcomes, and hence, solving organizational problems. A performance appraisal and field visit are considered to be the preferred delivery method of TNA for construction engineers in the Iraqi construction industry due to the stated advantages of these two methods compared to others. It has already been mentioned that companies used only one level which is PEST analysis to assess construction employees' training needs, but there is a drawback to this method due to the biased behaviour of the appraisers. It is therefore important for Iraqi construction companies to carry out comprehensive TNA, rather than focussing only on the organisational level. In the future, researchers could carry out a longitudinal study to determine appropriate methods for analysing TNA of Iraqi construction firms. This may allow better TNA techniques to be judged, especially under the specific circumstances found in Iraq.

8.3 Major Contributions and Implications

Because of its usefulness, these proposed models s can be used with any kind of survey instrument to determine deficiencies in any subject. It is designed to professionally manage organization-wide as well as departmental and group assessments. It also has a high potential for serving as a testing tool for selecting the appropriate first of stage of a training programme. These models are not limited within the HR functions. Using a similar approach, the models can also assist in analysing skills and knowledge deficiencies in any organization for skills and knowledge management purposes. This study has made important contributions to knowledge at different practical levels, as discussed in the following sub-sections:

8.3.1 Academic Contributions

For scholars, these are the academic contributions made by this study:

One significant original contribution of this research is an in-depth understanding of the TNA practice in the Iraqi construction industry. To the best of the researcher's knowledge, a review of the literature in the field of the quality of training programmes revealed the need for more empirical research on TNA practice, and therefore, this study integrates and extends the studies conducted in this area which address the issue of the quality of training in general and training programmes in particular. Accordingly, this study could be the first study that has been applied specifically to the Iraqi construction industry. This research study has introduced a model of TNA for construction engineers which have never been previously adopted. Little attention has been devoted to the training needs assessment practices in the context of the public and private sectors (Elhasan, 2006; Phillips, 1997; Akhorshaideh, 2013). Moreover, no attention has been paid to skills and knowledge assessment. Therefore, this study contributes to knowledge as being the first empirical study carried out into TNA and makes a contribution to fill the gap between theoretical constructs and practical evidence of TNA models within the context of the construction industry. This study could be useful to scholars, as it is a step towards theory-building in relation to TNA for Iraqi construction workforce. A large body of knowledge has been brought together on: construction management problems, training in construction, TNA concepts and TNA in Arab countries, barriers to and drivers of TNA, TNA methods and techniques, skills and knowledge assessments; diverse schools of thought have been combined into one integrated perspective. The review of the literature in these fields' revealed gaps and the need for more empirical studies to be conducted, therefore, this study integrates, refines and extends empirical work previously conducted in these fields, and fills some of these research gaps. This study has responded to the recommendations of many researchers such as Mendonca (2001), Clark *et al.* (1993), Tracey *et al.* (2001), Boints (2004) and Agnaia (1996), who have emphasised the need for more studies in the field of training in general and in developing and Arabic countries in particular. This study is also regarded as one of the first academic studies of training organizations in Iraq as no previously published research study has examined this topic in Iraq. Therefore, it is hoped that it provides a basis for the development of further scientific research in this area. Furthermore, this study has laid the groundwork for addressing the problems associated with the skills and knowledge deficit in the Iraqi construction industry; it is therefore highly recommended that researchers and scholars should conduct more empirical work to expand our knowledge on this subject.

8.3.2 Practical Contributions

The results of this research, which have several important implications for TNA, including all the issues related to skills and knowledge assessment activities in Iraqi construction organizations, are presented throughout the study; specifically in Chapters 1 and 2. It could be argued that, from a practical point of view, this study offers several major contributions to management. As many organisations (Abdalla et al., 1995), especially those in developing and Arab countries, do not conducted proper training programmes, therefore achieving poor levels of success from those training programmes, this study is important because it has been able to provide useful guidelines to explain the importance of TNA in enhancing the quality of training in construction industry. Accordingly, experts can gain a better understanding of the influencing that TNA has on the quality of training programmes and what they need to focus on in order to improve the quality of training programmes. Understanding TNA can help practitioners to develop an effective approach to changing current practices that inhibit the quality of training programmes in companies (Iqbal et al .,2011). As many organisations feel that TNA is a waste of time and money with a low rate of benefit, most of them do not pay it sufficient attention (Agnaia, 1996). However, this study has resulted in the formulation of a road-map and suggestions as to useful guiding principles in the form of the critical elements that can enhance success in training programmes. It has provided assessments of TNA methods and techniques, and of the skills and knowledge requirements of construction engineering workforces. All the related indicators of, and barriers to, the TNA process within construction companies have also been evaluated. From this study, experts can derive a better understanding of the role of TNA activities in the development of organizations, especially in the world of today's construction businesses. It can help managers to understand how they can better manage their TNA activities, what they need to focus on and what they need to do to improve them. Based on the findings of this study, and in order to improve TNA activities in Iraq and identify real training needs, managers need to consider all the following points.

With regard to Iraqi governmental organizations, this study could be helpful in persuading them of the significance of TNA and of the need to develop practical policies for the improvement of the long term performance of training institutes in the construction industry by effective training activities administration. The research findings are also beneficial for policy makers and curriculum planners. In current practice, there is limited awareness of how to implement long-term strategies to augment skills in the construction industry.At the moment in the construction industry, managerial skills for engineering employees are becoming increasingly important issues for companies (Lyon, 2004). Therefore, training has been seen as highly relevant to the professional development of HRM personnel in construction companies (Iqbal et al .,2011 ;Gibb, 2003). However, the identification and development of appropriate measures for engineers in the construction industry in developing countries have yet to be explored. The identification of skills and knowledge therefore provides an important guideline to both aspiring and experienced construction engineers on what construction companies expect of them in terms of their managerial and technical skills. Accordingly, these findings may help construction engineers who lack the relevant skills and knowledge to acquire the relevant training as part of their professional development. Engineers who already possess the relevant skills and knowledge may also appreciate the findings as it may provide a knowledge-based impetus for achieving higher performance. The findings also provide a basis on which construction companies in the Iraq construction industry seeking to recruit, monitor, retain and promote engineers, can make informed and objective decisions towards engaging those with the appropriate skills and knowledge. As a result, one contribution to knowledge from the findings reported in the study is the identification of gaps in the skills and knowledge of engineers that can be mapped towards improving the work place and subsequently towards the organizational development of construction companies in Iraq. Construction companies and construction engineering employees in many other developing countries can also benefit from the findings; especially those in the Middle East, where the managerial challenges facing construction companies are likely to be similar. Surprisingly, this research has revealed that there is no formal body that recognizes or organises the practices of trainers or training institutes in both the public and private sectors in Iraq this could be due to the following reasons:

- The lack of appropriate training for managerial skills and other critical skills for training coordinators and centre administrator; especially skills in the fields of training programme design, evaluation, planning, leadership, communication and follow up.

- A lack of appropriate facilities needed for training, such as: conference rooms, sophisticated technological training equipment, good furniture, adequate classrooms and appropriate air conditioning or heating. Finally, the main contribution of this thesis is the development and empirical testing of a model of TNA which addresses the main gap in research as identified in the literature.

8.3.3 Recommendations for Practice

This study has revealed a number of important issues related to the TNA programmes conducted in the construction industry; these are presented in Chapters 2 and 5. Due to the absence of an official body that regulates and observes training institutions in Iraq, there is a detrimental effect on quality of the training institutions in this country. It is therefore suggested that the government of Iraq should create a specialized formal body to regulate, supervise and license training service organizations, and provide follow-up activities including the approval of trainers according to scientific and professional standards and rules. Training activities in general need to be considered seriously. Trainers, and training programme coordinators and administrators need to be knowledgeable, well-trained, well-educated and experienced. The following recommendations are proposed:

- Based on the results of this study, TNA should be based on objective systematic techniques, rather than being subject to the opinions of employees' 'directs managers'. When assessing training needs, emphasis should be put on all levels of need. Analyses should include individual, organizational and job training needs, rather than just the need of the individual.

- TNA should be carefully considered as a serious issue within organizations: trainees' managers and staff providing TNA must be well-educated and experienced, as they have the responsibility to improve the training situation and change the views of their organizations about the importance of TNA.

- Top managers need to be committed to, and supportive of TNA activities, by being involved in the formulation of T&D strategies, plans and objectives.

- With respect to the absence of proper training needs assessment activities designed to develop the skills, knowledge and abilities of construction engineers, thus enhancing their capability in the work place, the researcher recommends the establishment of an effective training needs assessment path for construction companies which would ensure the building of competence of their employees and would provide them with the skills, capabilities, knowledge and attitudes required for their jobs.

8.3.4 Recommendations for Further Research

In this research a number of important objectives have been addressed, and significant contributions made, regarding the identification of training needs in the Iraqi construction industry. This has been achieved by identifying the main concerns and problems which face TNA activities, in addition to exploring the skills and knowledge gaps in Iraqi construction engineers. The conclusions and implications derived from this study have been conclusive, but still some issues remain tentative until such time as they are confirmed by similar studies using identical or alternative research methodologies. Further studies are therefore required to extend this research and to help improve TNA in Iraq. Therefore, a number of recommendations are made for future research. They are:

- As this study concentrated on limited groups of construction engineers, it is recommended that future efforts should involve construction employees from a variety of backgrounds and from different levels in the organizations. This could strengthen the findings of this study by showing whether they can be generalized beyond the current scope.

- Replication of this study in other Iraqi public or private sectors which might yield understanding of those contexts and could help to provide more valuable information and provide the opportunity for comparison.

- The researcher recommends further research to study the phenomenon of TNA from the perspectives of companies.

- A comparative study between UK organizations and Iraqi organizations that invest in people would also be helpful.

8.4 Limitations of the Study

Every research study faces some limitations which constrain the researcher; following are some of the limitations of this study:

- This study is limited to Iraqi construction companies, so the generalization of the findings of the present study is limited to the construction industry. In Iraq the generalization to other business sectors is impossible; this could be due to different organizational environments and contexts, and to different social, economic and political issues.
- There was a lack of literature on TNA in Iraq and other Arab countries. Most of the literature available related to gulf countries. In addition, skills and knowledge assessment of construction engineers is a relatively new concept, so there was a lack of related studies to help with formulating an accurate measurement of skills and knowledge assessment. Previously conducted empirical studies in the field of the research were lacking, thus, there was a lack of scales and measurements which could have been used to establish a cause-and-effect study for examining the relationship between T&D and organisational performance. As mentioned before, most of the studies available produced controversial results that do not encourage further research. However, it must be emphasised that this study was not designed to establish a cause-and-effect relationship between T&D and organizational performance, as this is difficult to do.

References

1- Abdalla, H., Maghrabi, A., & Raggad, B. (1998). Assessing the perceptions of human resource managers toward nepotism: A cross-cultural study. *International Journal of Manpower, 19*(8), pp. 554-570.

2- Abdalla, I., & Al-Homoud, M. (1995). A Survey of management training and development practices in the state of Kuwait. *Journal of Management Development, 14* (3), pp. 14-25.

3- Abdulla, S., & Ahmed, M. (2010). *An empirical analysis of Libyan business environment and foreign direct investment.* (PhD thesis), Durham University, Durham. Retrieved from http://etheses.dur.ac.uk/462/Abu-Doleh, J. (2004). Management training and development needs assessment practices in the Jordanian private and public sectors: Integrated or Isolated. *Journal of international Management Development, 9*(2), pp. 107-121.

4- Abdullah, H. (2009). Training Needs Assessment and Analysis: A Case of Malaysian Manufacturing Firms. *European Journal of Scientific Research 37*(3), pp. 351-360.

5- Abu-Arqoub, I. (2008), Ideas on training practices in the Jordanian training institutions. *Al Balka University Journal for Social Studies*, 8(4), 61-68.

6- Abusalama, F. A. (2008). *Barriers to adopting activity-based costing systems (ABC): an empirical investigation using cluster analysis.* (PhD thesis), Dublin Institute of Technology, Dublin.

7- ACED (2008). *Skills Gap and Training Needs Analysis of the Construction Sector and Related Supporting Services in Aqaba.*

8- Adetunji, I.O. (2005). *Sustainable construction: A web-based performance assessment tool.* (Unpublished PhD thesis), Loughborough University, Loughborough.

9- Adi, H. P., & Ni'am, M. F. (2012). Improving skill's strategies of Indonesian construction labours to have global competitiveness. *International Journal of Civil & Structural Engineering, 3*(1).

10- Adnan, E., Sherif, M., & Alaá, E. (2009). Essential skills and training provisions for building project stakeholders in Palestine. *Journal of Construction in Developing Countries, 14* (1).

11- Agnaia, A. A. (1996). Assessment of management training needs and selection for training: the case of Libyan companies. *International Journal of Manpower, 17* (3), pp. 31–51.

12- Ajayim, R. J (2012). Strategies for sustainable housing cooperatives in South Africa; Thesis submitted in fulfilment of the requirements for the award of the degree of philosophy doctor in construction management, faculty of engineering.

13- Akhavan T. A., & Abu Bakar, A. H. (2009). Training, motivation, and performance: the case of human resource management in construction projects in Mashhad, Iran. *International Journal of Project Management, 27*(5), pp. 471–480.

14- Akhorshaideh,A(2013) *Investigating factors which influence the quality of training progroammes in public university in Jordan* , PhD thesis, ,Salford Business School

15- Al-Bahussain, A. (2000). *Human resource development: An investigation into the nature and extent of training and development in the Saudi private manufacturing.* (Unpublished PhD thesis), Bradford University, Bradford.

16- Al-Ghassani, A. M., (2003*). Improving the structural design process: a knowledge management approach*. (published PhD thesis), Loughborough University, Loughborough.

17- Al-Husan, F., & Brennan, R. (2009). Transferring western HRM practices to developing countries: the case of a privatized utility in Jordan. *Personnel Review, 38*(2), pp. 104-123.

18- Al-Kazemi ,A &Ali, A.(2002). Managerial problems in Kuwait. *Journal of Management Development, 21*(5) pp. 366-375

19- Al-Khayyat, R. (1998). Training and development needs assessment: a practical model for partner institutes. *J Eur. Ind. Train. 22* pp.18-27.

20- Al-Madhoun, M., & Analoui, F. (2003). Management and development: the training programmes for small and micro enterprises in Palestinian territories. *Management Research News, 26*(6), pp. 39-67.

21- Altarawneh, I. (2005). *Training and development effectiveness: practices, roles and impacts on performance in Jordanian banking organizations.* (published PhD thesis), Huddersfield University, Huddersfield.

22- Altarawneh, I. (2009). Training and development evaluation in Jordanian banking organizations. *Research and Practice in Human Resource Management, 17*(1), pp. 1-23.

23- Altarawneh, I. (2010). Human resource development in Arab organizations: the case of Jordanian organizations. *International Journal of Business, Management and Social Sciences, 1*(1), pp. 41-54.

24- Altschuld, J.W. & Lepicki, T.L. (2010). Needs assessment. In Watkins, R., & Leigh, D. (Eds.) *Handbook of improving performance in the workplace: selecting and implementing performance interventions* (pp. 771-91). San Francisco: Pfeiffer Publishing.

25- Alwekaisi.K,S (2009). Training needs analysis practices: a survey on large Scale companies in manufacturing industry in Saudi Arabia. Burnel Business School Symposim . *Available at* www.brunel.ac.uk/__data/assets/file/.../phdSimp

26- Alwi, S. (2004). *Training field personnel for small to medium construction companies: an alternative tool to increase productivity*. (Unpublished PhD thesis), Tarumanagara University, Jakarta.

27- Amaratunga, D., Baldry, D., Sarshar, M., and Newton, R. (2002). *Quantitative and qualitative research in environment the built. Application of "Mixed" Research Approach*.

28- Ananiadou, K., Jenkins, A., & Wolf, A. (2003). The benefits to employers of raising workforce basic skills levels: a review of the literature. , University of London.

29- Anderson, G. (1994). A proactive model for training needs analysis. *Journal of European Industrial Training, 18* (3), pp. 23-8.

30- Anderson, J. E. (2000). Training needs assessment, evaluation, success, and organizational strategy and effectiveness: an exploration of the relationships. (Doctoral dissertation), Utah State University, Logan.

31- Arshad, R.A. (1997). Training needs of Malaysian site managers. (Unpublished MSc thesis), University of Glamorgan, Glamorgan.

32- Arthur, W. Jr., Bennett, W. Jr., Edens, P.S., & Bell, S.T. (2003). Effectiveness of training in organizations: a meta-analysis of design and evaluation features. *Journal of Applied Psychology, 88*( ), pp. 234–245.

33- Ashford, W. (2008). *One third of firms report skills gaps*. (date) Computer Weekly. Retrieved from; http://web.ebscohost.com/ehost/delivery?vid=11&hid=116&sid=f32211be - d7c0-4c31

34- Ashton, D., & Easterby-Smith, M. (1979). *Management Development in the Organization*. London: Macmillan.

35- Atiyyah, H. (1993). Management development in Arab countries: the challenges of the 1990s. *Journal of Management Development, 12*(1), pp. 3-12.

36- Azizi, N , & Gavazi, A (2010).Validating a multi-layer qualitative needs assessment to highlight training requirements in traditional small enterprises: case study Iranian stone industries..***European educational research association*.** Paper presented at ECER 2010, Helsinki, 25-17 August 2010.

37- Babbie, E., & Mouton, J. (2002). *The practice of social research.* Southern Africa: Oxford University Press.

38- Baharudin, & Khairul, S. B. (2006). Construction management skills for the global market (News Article)

39- Barbazette, J. (2006). *Training needs assessment: methods, tools, and techniques*. San Francisco: Pfeiffer Publishing,

40- Barrett, A., & O'Connell, P. (2000). Does training generally work? The return to in-company training. *Industrial and Labor Relations Review, 54* (3), pp. 647-662.

41- Bartel, A. (1994). Productivity gains from the implementation of employee training programs. *Industrial Relations, 33* (4).

42- Bartel, A. (1995). Training, wage growth, and job performance: evidence from a company database. *Journal of Labour Economics, 13* (3), pp. 401-425.

43- Bartel, A. (2000).Measuring the employer's return on investments in training: evidence from the literature. *Industrial Relations 39* (p,3),

44- Bee, .F and Bee , R. (1994). *Training needs analysis and evaluation (developing skills).* Publisher Chartered Institute of Personnel & Development (1 Jun 1994)

45- Bishop, J.H. (1997). What we know about employer-provided training: a review of the literature. *Research in Labor Economics, 16* (1), pp. 19-87.

46- Black , S. & Lynch , L. (1997). How to compete: The impact of workplace practices and information technology on productivity. Working paper National Bureau of Economic Research, Cambridge, MA.

47- Booth, A. L. (1991). Job-related formal training: who receives it and what is it worth? *Oxford Bulletin of Economics and Statistics, 53* (3), pp. 281–294.

48- Bowman, J., & Wilson, J. (2008). Different roles, different perspectives: perceptions about the purpose of training needs analysis. *Industrial and Commercial Training, 40* (1), pp. 38-41.

49- Boydell, T. (1976). *A guide to the identification of training needs*. London: British association for commercial and industrial training.

50- Brandenburg, S. G., Haas, C. T., & Byrom, K. (2006). Strategic management of human resources in construction. *Journal of Management in Engineering, 22*(2), pp. 89-96.

51- Brink, D. (2007). *Training needs analysis of managers at Shatterprufe Garankuwa*h. Submitted in partial fulfillment of the requirements for the degree **...** Degree**:** MBA **(**Masters in Business Administration). University: Tshwane University of Technology

52- Brown, (2009). Building a bridge of understanding how barriers to training participation become barriers to training transfer. *Journal of European Industrial Training, 33* (6), pp. 421.

53- Brown, G. P. & Read, A. K. (1984). Personnel training policies: Some lessons for Western companies. Long Range Planning. Volume 17: 48-57

54- Brown, J. (2002). Training needs assessment: a must for developing an effective training program. *Public Personnel Management, 31* (4), pp. 569-578.

55- Brunello, G. and De Paola, M. (2004b), *Market Failures and the Under-provision of Training*, CESIFO Discussion Paper

56- Bryman, A. (1988). *Quantity and quality in social research*. London: Unwin Hyman.

57- Bryman, A. (2012) *Social Research Methods.* 4th ed. Oxford: Oxford University Press – Chapter 2.

58- Bryman, A. and Cramer, D. (2009) *Quantitative data analysis with SPSS 14, 15 and 16: A guide for social scientists*. London: Routledge

59- Bryman, A., & Bell, E. (2007). *Business research methods,* (2nd ed.). New York: Oxford University Press Inc.

60- Bryman, A., & Cramer, D. (2001). *Quantitative data analysis with SPSS release 10 for Windows: a guide for social scientists.* London: Routledge.

61- Cakan, H(2012). Analysis and modelling of roofer and steel worker fall accidents. Wayne State University Dissertations.

62- Callahan, J.R., & Dipietro, P. (1994). A coordination structure approach to the management of projects. *IEEE Transactions of Engineering Management, 41*, pp. 394-403.

63- Campbell, J. P. (1971). Personnel training and development. Annual Review of Psychology. Volume 22: 265-602.

64- Carlisle, J., Bhanugopan, R., & Fish, A. (2011). Training needs of nurses in public hospitals in Australia: review of current practices and future research agenda. *Journal of European Industrial Training, 35* (7), pp. 687-701.

65- Carroll, G.R., & Mayer, K.U. (1986). Job-shift patterns in the Federal Republic of Germany: the effects of social class, industrial sector and organizational size. *American Sociological Review, 51* (3), pp. 323-341.

66- Castellanos, M.R., & Martín, M. (2011). Training as a source of competitive advantage: performance impact and the role of firm strategy, the Spanish case. *The International Journal of Human Resource Management*, *22* (03), pp. 574-594.

67- Castrol, F.G., Kellison, J.G., Boyd, S.J. & Kopak, A. (2010). A methodology for conducting integrative mixed methods research and data analysis. *Journal of Mixed Methods Research 4(4).*

68- Cekada, (2011). Conducting an effective needs assessment; available at www.asse.org

69- Cekada, L. (2010). Training needs assessment: understanding what employees need to know. *Professional Safety*, *55* (3), pp. 28-33.

70- Chan, C.A.P. (2002). Training needs of construction project managers: from identification to implementation. In Ogunlana, S. O. (Ed.), *Training for construction industry development* (pp. 111-116). Rotterdam: CIB publication.

71- Chan, P. W., & Dainty, A. R. J. (2007). Resolving the UK construction skills crisis: a critical perspective on the research and policy agenda. *Construction Management and Economics*, *25* (4), pp. 375-386.

72- Chang, J. C., Chiang, T. C., & Kun-YI, C. (2012). The systematic construction and influential factors of training needs assessment. *International Journal of Business and Social Science, 3* (p, 24)

73- Chapman, D. (2000). Preferences of training performance measurement: a comparative study of North Carolina training professionals and non-training managers. (Unpublished doctoral dissertation), North Carolina State University, Raleigh.

74- Cheng, P. H., & Dawson, S.D. (1998). A study of statistical process control: practice, problems and training needs. *Total Quality Management, 9* (1), pp. 3-20.

75- Chileshe, (2010). A practical approach for assessing the project manager's knowledge, skills and attributes – evidence from U.K construction projects. *Project Management - Creating a Future Page 1 of 13* .

76- Chileshe, N., & Haupt, C. (2007). Industry and academia perceptions of construction management education: the case of South Africa. *Journal for Education in the Built Environment, 2* (2), pp. 85-114.

77- Chini, A. R., Brown, B. H., & Drummond, E. G. (1999). Causes of the construction skilled labor shortage and proposed solutions. In *ASC Proceedings of the 35th Annual Conference. California Polytechnic State University, San Luis Obispo, California* (pp.187–196).

78- Chinowsky, P. S. (2002). Integrating management breadth in civil engineering education. *Journal of Professional Issues in Engineering Education and Practice,128* (3), pp. 138–143.

79- Chiu, W., Thompson, D., Mak, W. M., & Lo, K. L. (1999). Re-thinking training needs analysis: a proposed framework for literature review. *Personnel Review, 28*(1/2), pp. 77 – 90.

80- Choo, C. W. (2001) Environmental scanning as information seeking and organizational learning. *Information Research. 7* (1),

81- Choo, S., & Bowley, C. (2007). Using training and development to affect job satisfaction within franchising. *Journal of Small Business and Enterprise Development, 14* (2), pp. 339-352.

82- Chunn, G.C., & Thacker, C. (1993). A manager's role in developing and reinforcing strong training. *Corrections Today, 55* . p. 48þ.

83- Clardy, A. (1997). *Studying your workforce: applied research methods and tools for the training and development practitioner.* London: SAGE Publications.

84- Clarke N. (2003). The politics of training needs analysis. *Journal of Workplace Learning, 15* (4), pp. 141-153.

85- Clifford, J., Schervayder, R, S. Mayo, (2004*). Construction Management Fundamentals*. New York: McGraw Hill,

86- Clover, R., Long, D., Hass, C., & Alemany, C. (1999). Return -on-investment for analysis of education and training in the construction industry. *Journal of Small Business and Enterprise Development, 15* (2),

87- Cohen, L., Manion, L., & Morrison K. (2000). *Research Methods in Education* (5th ed.). UK : RoutledgeFalmer.

88- Collins, H. M. (1983). *An empirical relativist programme in the sociology of power and symbolism.* London: Routledge and Kegan Paul.

89- Collis, B. (2002). So how effective is your training? *Beverage Industry, 93* (1), p. 52.

90- Collis, J., & Hussey, R(2003). Business Research: *A practical guide for undergraduate and postgraduate students* (2nd ed.) Basingstoke: Macmillan.

91- Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology 85:*pp. 678–707.

92- Connor. H., Dench, S., & Bates, P. (2000). An assessment of skill needs in engineering: a comprehensive summary from employers of skills requirements in engineering.

93- Construction Review. (1997). "Trends in U.S. Construction, 1997 to 2001." Volume 42 (Spring) 4: 4-17.

94- Construction Users Roundtable (CURT) (2006) 'Workforce crisis: exploring industry solutions', *The Voice, Winter 2006/2007, pp.18–19.*

95- Construction Users Roundtable (CURT) (2007) 'Crisis in construction: help wanted', *The Voice*, *Summer*, *pp.20 22.*

96- Cooke, K. (1979). A model for the identification of training needs. *Public Personnel Management,8* (4), pp. 257-261.

97- Cooney, R., Terziovski, M., & Samson, D. (2002). Employee training quality management and the performance of Australian and New Zealand manufactures. /508

98- Cooper, D. R., & Schindler, P. S. (1998). *Business research methods* (6th ed.) Singapore: Irwin/McGraw-Hill.

99- Cooper, D. R., Schindler, P. S. (2006). *Business Research Methods* (9th ed.). New Delhi, India: McGraw-Hill.

100- Craig, M. (1994). *Analysing Learning Needs*. Hampshire: Gower.

101- Creswell, J. W. (2003). *Research design-qualitative, quantitative and mixed methods approaches* (2nd ed.) London: SAGE Publications.

102- Cross, R. (2000). Looking before you leap: assessing the jump to teams in knowledge-based work. *Business Horizons, 43* (5), pp. 29-36.

103- Crossan, F. (2003). *Research philosophy: towards an understanding*. (pp. 45-55) Retrieved from www.slis.indiana.edu

104- Crutchfield, E. (2000). *Developing human capital in American manufacturing: a case study of barriers to training and development*. New York: Taylor & Francis.

105- Dada, J. O., & Jagboro, G. O. (2012). Core skills requirement and competencies expected of quantity surveyors: perspectives from quantity surveyors, allied professionals and clients in Nigeria. *Australasian Journal of Construction Economics and Building*, *12*(4), 78-90.

106- Dahiya ,S and Jha,A(2011) Training need assessment : A critical study . *International Journal of Information Technology and Knowledge Management January-June, Volume 4, No. 1, pp. 263-267.*

107- Dainty, A. R. J. (2008). Methodological pluralism in construction management research. In A. Knight & L. Ruddock (Eds.) *Advanced research methods in the built environment.* (pp. 1-11). Oxford: Wiley-Blackwell.

108- Dainty, A. R. J., Ison, S. G., & Root, D. S. (2004). Bridging the skills gap: a regionally driven strategy for resolving the construction labour market crisis. *Engineering, construction and architectural management, 11*(4), pp. 275-283.

109- Daniels, S. (2003). Employee training: a strategic approach to better returns on investment. *The Journal of Business Strategy, 24* (5), pp. 39-42.

110- Dawe, S. (2003). Determinants of successful training practices in large Australian firms. *National Centre for Vocational Education Research. 590* .

111- Dayal, I. (1989). *Management training in organizations*. New Delhi, India: Prentice Hall of India Private Ltd.

112- De Graaff, E., & Ravesteinjn, W. (2001). Training complete engineers: global enterprise and engineering education. *European Journal of Engineering Education, 26* (4), pp. 419-427.

113- Delgado, D. (2006). *A framework for building quality into construction projects.* (Unpublished PhD thesis), University of Birmingham, Birmingham.

114- Denby, S. (2010). The importance of training needs analysis. *Industrial and Commercial Training, 42* (3), pp. 147-50.

115- Denzin, N. K. and Lincoln, Y. S. (2000). Hand Book of Qualitative Research. California: Sage publications Inc.

116- Denzin, N. K., & Lincoln, Y. S. (2008). *The Landscape of Qualitative Research* (3rd ed.) Thousand Oaks: Sage publications.

117- Department for Education and Employment (DfEE) (2000). An assessment of skill needs in construction and related industries. *Skill Dialogues: Listening to Employers Research Papers*. London: DfEE and Business Strategies Ltd.

118- Department of Employment and Workplace Relations (2005). *Skills shortages: concepts, definitions and indicators.* Retrieved from http://www.skillsinfo.gov.au/.../0D3A6A44-4BAF-4DA5-888B-5A6876B697CE/0/skillshortagesconceptsandindicators.doc

119- Desimone, R. L., Werner, J. M., & Harris, D.M. (2002). *Human Resource Development* (3rd ed.). Orlando, FL: Harcourt College.

120- DEST (2002). *Nature and causes of skill shortages.* Retrieved from http://www.skillsinitiative.gov.au/documents/nature_causesskillshortages.pdf

121- Deutsch, A. (1979). *The human resource revolution: communicate or litigate.* St Louis, NY: McGraw-Hill Book Co.

122- Devi & Mallika ,R (2012). Training needs identification of nursing staff: a case study of a health care organization. *EXCEL International Journal of Multidisciplinary Management Studies, 2* (5). Retrieved from http://zenithresearch.org.in/

123- Devine, F. (2002). Qualitative methods. In D. Marsh & G. Stoker (Eds.), *Theory and methods in political science* (2nd ed., pp. 197-215). New York, NY: Palgrave Macmillan.

124- DiLauro, T.J. (1979). Training needs assessment: current practices and new directions. *Public Personnel Management, 8* (6), pp. 350-359.

125- Druker, J., White, G., Hegewisch, A., & Mayne, L. (1996). Between hard and soft HRM: human resource management in the construction industry. *Construction Management Economics, 14* ( ), pp. 405-416.

126- DTI, (2003). *Review of early estimates of construction output for GDP in 2003.* London: Department of Trade and Industry.

127- Du Plessis, C., et al. (2002) Agenda 21 for Sustainable Construction in Developing Countries, CSIR Report BOU/ E0204, CSIR, CIB & UNEP-IETC, Pretoria.

128- Dubem, I., Ikediashi, D. I., Stephen, O., Ogunlana, S. O., Oluwaseyi, A., Awodele. O., A., & Okwuashi, O. (2012). An evaluation of personnel training policies of construction companies in Nigeria. *Journal of Human Ecology, 40* (3), pp. 229-238.

129- Dubois, D., & Rothwell, W. (2004). Competency-based or a traditional approach to training? *Training and Development, 58* (4), pp. 46-58.

130- Dufficy, D. (2001). Training for success in a new industrial world Industrial and commercial training. *Industrial and Commercial Training, Vol. 33 Iss: 2, pp.48 - 54*

131- Durra, A. B. (1990). Assessment of training needs within the context of administrative reforms in Jordon. *International Journal of Manpower, 1* (7), pp. 3-10.

132- Dyer, S. (1994). Kirkpatrick's mirror. *Journal of European Industrial Training, 18* (5), pp. 31-32.

133- Easterby-Smith, M., & Lowe, A. (2002). *Management Research: An Introduction.* London: Sage Publications.

134- Easterby-Smith, M., Thorpe, R., & Lowe, A. (2008). *Management research: an introduction* (4th ed.). London: Sage Publications.

135- Edum-Fotwe, F. T., McCaffer, R. (2000). Developing project management competency: perspectives from the construction industry. *International Journal of Project Management, 18* , pp. 111-124.

136- Egbu, C. O. (1999). Skills, knowledge and competencies for managing construction refurbishment works. *Construction Management and Economics, Taylor and Francis Journals, 17*(1), pp. 29-43.

137- Egbu, C.O., & Botterill, K. (2002). Information technologies for knowledge management: their usage and effectiveness. *Information Technology Conference, 7(2002)pp. 125–137*

138- Ejowhomu, O. A., Proverbs, D. G., & Olomolaiye, P. (2006). Multiskilling: a UK construction and building services perspective, D. Boyd, (Ed). *Proceedings of the 22 Annual ARCOM Conference: 4–6 September 2006, Association of Researchers in Construction Management*, (pp. 885–894). Birmingham, UK.

139- Elbadri, A. N. A. (2001). Training practices of polish companies: an appraisal and agenda for improvement. *Journal of European Industrial Training, 25* (2), pp. 69-79.

140- El-Sabaa, S. (2001). The skills and career path of an effective project manager. *International Journal of Project Management, 19* (1), pp.1-7.

141- Erasmus, B., Schenk, H., Swanepoel, B., & Van Dyk, W. (2000). *South African human resource management theory and practice* (2nd ed.). Cape Town: Juta.

142- Erasmus.,B., Van wyk,D. and Schenk, V (2003). *South African Human Resource Management*. Juta & Co Ltd.

143- Eze, J. I., Obiegbu, M. E., & Jude-Eze, N. E. (2005). *Statistics and quantitative methods for construction and business managers.* Nigeria: The Nigeria Institute of Building.

144- Fairclough, J. (2002). *Rethinking construction innovation and research: A review of government R and D policies and practices*. London: Department of Trade and Industry.

145- Farell, P., & Gale, A. (1998). Career progress paths for UK site managers. *COBRA 1998. The Royal Institution of Chartered Surveyors, UK. 2, 8*

146- Farooqui, R., Saqib, M., & Ahmed, S. (2010). *Desirable attributes and skills for graduating construction management students.* Retrieved from http://ascpro0.ascweb.org/archives/cd/2010/paper/CEGT206002010.pdf

147- Farooqui, R., Saqib, M., Ahmed, S. (2008). Assessment of critical skills for project managers in Pakistani construction. In *First International Conference on Construction In Developing Countries (ICCIDC–I) "Advancing and Integrating Construction Education, Research & Practice" 4-5 August 2008,* Karachi, Pakistan Industry.

148- Farrell, P., & Gale, A. (2003). Career progression path as a determinant of site manager skills. In D. J. Greenwood, (Ed.) *19th Annual ARCOM Conference, 3–5 September 2003, Association of Researchers in Construction Management, University of Brighton* (pp.1,183–1,192). University of Brighton, Brighton.

149- Fellowes , R. & Liu, A. (1997) *Research methods for construction*, Blackwell Science, Oxford; Malden, MA, USA.

150- Ferdous, T., & Razzak, B. M. (2012). Importance of training needs assessment in the banking sector of Bangladesh: a case study on National Bank Limited (NBL). *International Journal of Business and Management, 7* (10), pp.

151- Ford, J. K., & Noe, R. A. (1987). Self-assessed training needs: the effects of attitudes toward training, managerial level and function. *Personnel Psychology, 40* (1), pp. 39-53.

152- Forde, C., & Mackenzie, R. (2005). Skills shortages and casualization in construction: evidence from two UK Surveys. *Construction Information Quarterly, 7* (3), pp. 92- 96.

153- Froon, R. (2007). *An Investigation into the skills shortage in the South African information and communication technology industry.* (Published MBA thesis), Milpark Business School, Johannesburg, South Africa.

154- Garavan, T. N., Barnicle, B., & Heraty, N. (1993). The training and development function: Its search for power and influence in organizations. Journal of European Industrial Training. Volume 7: 22-32.

155- Gay, L. R., & Airasan, P. (2003). *Educational research: competencies for analysis and applications* (7th ed.). New Jersey: Merrill Hall Prentice.

156- George, B., Sims, P., McLean, A. N., & Mayer, D. (2007). Discovering your authentic leadership. *Harvard Business Review, 85* (2), pp. 129-38.

157- Ghufli, A. (2012). *Training needs analysis: an empirical study of the Abu Dhabi police*. (Unpublished doctoral symposium), Brunel Business School, London.

158- Gill, J., & Johnson, P. (2002). *Research methods for managers* (3rd ed.). London: SAGE publications.

159- Glover, R. W., Long, D. W., Haas, C. T., & Alemany, C. (1999). *Return-on-investment (ROI) Analysis of education and training in the construction industry*. Center for Construction Industry Studies.

160- Glover, R.W., Goodrum, P., & Haas, C. (2006). Construction industry craft training experience to date and the path forward. In *2nd Specialty Conference on Leadership and Management in Construction and Engineering - International Perspectives, 4-6.p350 May, 2006* UK. Grand Bahama Island, Bahamas

161- Goldstein, I. L. (1980). Training in work organizations. Annual Reviews in Psychology. Volume 31: 229-272

162- Goldstein, I. L., & Ford, J. K. (2002). Training in organizations. Wadsworth: 22; 50; 83; 208

163- Goldstein, I.L. and Ford, J.K., (2000)*Training in Organizations*, 4th edition, Belmont: Wadsworth,

164- Goldstein, I.L., 'Training', in Slack, N. (1997) *Operational Management. The Blackwell Encyclopedia of Management*, vol. IX, Cambridge: Blackwell, 1997, pp. 573-581.

165- Gomez, P. Lorente, J., & Cabrera, R. (2004). Training practices and organizational learning capability relationship and implications. *Journal of European Industrial Training, 28* (2/3/4), pp. 234-256.

166- Goodrum, P., Wang, Y., Haas, C., Glover, R., & Vaziri, S. (2007). Construction industry craft training in the United States and Canada, research Summary, Construction Industry Institute (CII), the University of Texas at Austin

167- Gould, D., Kelly, D., & White, I. (2004). Training needs analysis: an evaluation framework, *Nursing Standard, 18* (20), pp. 33-6.

168- Gould, D., Kelly, D., White, I., & Chidgey, J. (2004). Training needs analysis: a literature review and reappraisal. *International Journal of Nursing Studies, 41*(5), pp. 471-486.

169- Graham, J. K., & Mihal, W. L. (1986). Can your management development needs surveys be trusted? *Training and Development Journal*, pp. 38-42.

170- Grau-Gumbau, R., Agut-Nieto, S., Llorens-Gumbau, S., & Martinez-Martinez, I. M. (2002). Managerial training needs: a study of Spanish tourism organizations. *Tourism & Hospitality Research, 3* (3), pp. 234-244.

171- Graziano, A. M., & Raulin, M. L. (2007). *Research methods: a process of inquiry.* New York: Pearson Educational Inc.

172- Green, S., Newcombe, R., Fernie, S., & Weller, S. (2004). *Learning across business sector: knowledge sharing between aerospace and construction.* University of Reading, Reading.

173- Grugulis, I. (2007). *Skills, training and human resource development.* Hampshire: Palgrave Macmillan.

174- Gunawardena, N.D., & Jayawardane, A. K. W. (2002). Assessment of training needs: a case study of Sri Lanka. In S. O. Ogunlana (Ed.), *Training for construction industry development* (pp. 80-85). Rotterdam: CIB publication.

175- Gupta, K., Sleezer, C.M., & Russ-Eft, D.F. (2007). *A practical guide to needs assessment* (2nd ed.). San Francisco, CA: Pfeiffer Publishing.

176- Hair, J., Babin, B., Money, A., & Samouel, P. (2003). *Essentials of business research methods*. Hoboken, N. J: Wiley.

177- Halla, F. (2007). A SWOT analysis of strategic urban development planning: the case of Dar es Salaam city in Tanzania. *Habitat International, 31* , pp. 130-142.

178- Hansson, B., Johanson, U., & Leitner, K. H. (2004). *The impact of human capital and human capital investments on company performance: evidence from literature and European survey results*. pp. 338.

179- Hardik, S., & Raj, G., (2012). Training needs analysis for bus depot managers at GSRTC. *European Journal of Training and Development, 36* (5), pp. 527-543.

180- Harnisch, O. (2007). Analysis of senior management training needs in international hotel companies: a field study.

181- Harris, M. (1997). *Human resource management: a practical approach.* Philadelphia: Harcourt Brace College Publishers.

182- Hasan, H. (2008). *Exploring engineering employability competencies though interpersonal and enterprises skills.* Coventry University

183- Haslinda, A. (2009).Training needs assessment and analysis: a case of Malaysian manufacturing firms. *European Journal of Scientific Research, 37*(3), pp. 351-360.

184- Hass, C., Byrom, D., Srour, I.(2003). *The shortage of skilled craft workers in the U.S.,* the University of Texas, Austin.

185- Hassan P.F., Griffith, A., & Stephenson, P. (2004). Best practice training for construction site managers. *Construction Industry Quarterly, 6* (3), pp. 83-94.

186- Hassan, P. F. (2005). *A best practice framework for training UK construction site managers*, (Unpublished PhD thesis). Sheffield Hallam University, Sheffield.

187- Hassan, P. F., Griffith, A., & Stephenson, P. (2005). An empirical study of the training needs of site managers within the UK construction industry. In F. Khosrowshahi (Ed.), *21st Annual ARCOM Conference, 7-9 September 2005, SOAS, University of London. Association of Researchers in Construction Management, (Vol. 1, pp. 95-104.)*

188- Hoepfl, M. C. (1997:2). Choosing qualitative research: a primer for technology education researchers. *Journal of Technology Education, 9* (1), pp. 15-21.

189- Holton, E.F. III, Bates, R.A., & Naquin, S.S. (2000). Large-scale performance-driven training needs assessment. *Public Personnel Management, 29* (2), pp. 249-67.

190- Horan, P. (2010). Developing an effectiveness evaluation framework for destination management systems. (Unpublished PhD thesis), Queen Margaret University, Edinburgh.

191- Hussey, J., & Hussey, R. (1997). *Business research: a practical guide for undergraduate and postgraduate students*. New York: Palgrave.

192- Ikediashi, D. I., Ogunlana, S. O., Awodele, O. A., & Okwuashi, O. (2012). An Evaluation of Personnel Training Policies of Construction Companies in Nigeria. *Journal of Human Ecology*, *40*(3), 229-238.

193- Iqbal, M., Malik, S., & Khan, R. (2012). Answering the journalistic six on the training needs assessment of pharmaceutical sales representatives: comparative perspectives of trainers and trainees. *International Journal of Pharmaceutical and Healthcare Marketing*, *6* (1), pp. 71-96.

194- Irene Lill (2009) Multiskilling in construction - a strategy for stable employment, Ukio Technologinis ir Ekonominis Vystymas, 15:4, 540-560

195- Jacobs, R. L., & Washington, C. (2003). Employee development and organizational performance: a review of literature and directions for future research. *Human Resource Development International, 6* (3), 343-354.

196- Jahanger, K. Q. (2013). Important Causes of Delay in Construction Projects in Baghdad City. *Australian Journal of Basic and Applied Sciences, 7* (4), pp. 14-23.

197- Jamil, R. (2002). The Theory and Practice of Training Needs Analysis. (Unpublished dissertation). University of Warwick, Warwick.

198- Jamil, R. (2006). Training needs analysis practices: a survey of the top 1000 companies in Malaysia No :75171.

199- Jamil, R., & Md. Som, H. (2007). Training needs analysis: practices of top companies in Malaysia. *International Review of Business Research Papers*, 3 (3), pp.162-175.

200- Jayawarna, D., Macpherson, A., & Wilson, A. (2007). "Training commitment and performance in manufacturing SMEs: incidence, intensity and approaches. *Journal of Small Business and Enterprise Development, 14* (2), pp. 321-38.

201- Johnson, P., & Duberly, J. (2000). *Understanding management research.* London: Sage Publications.

202- Judith, B. (2002). Training needs assessment: A must for developing an effective training program. *Public Personal Management, 31*,(4), 569-578.

203- Katsanis, L. P. (2006). An assessment of professional training for product managers in the pharmaceutical industry. *Journal of Product & Brand Management*, *15* (5), pp. 324-330.

204- Kaufman, R., & Valentine, G. (1999). Relating needs assessment and needs analysis. *Performance and Instruction, 28* (10), 10-14.

205- Keraminiyage, K. P., Amaratunga, R. D. G., & Haigh, R. P. (2005). A capability maturity approach for construction projects improvement: use of case studies approach. In *Proceedings of 5th Postgraduate research conference : 13-15 April 2005, University of Salford* (pp. 465-475). University of Salford, Salford.

206- Kirkpatrick, D., and Kirkpatrick, J.D., (2006). *Evaluating Training Programs*. San Francisco, USA: Berrett-Koehler.

207- Kitching, J., & Blackburn, R. (2002).The nature of training and motivation to train in small firms. Small Business Research Centre Kingston University 384.

208- Kiwi Careers, (2002). *Construction Site Manager*. Retrieved from http://www.careers.co.nz

209- Kraak, A., & Press, K. (2008). The education-economy relationship in South Africa, 2001 – 2005. *Human Resources Development Review 2008: Education, Employment and Skills in South Africa,* (pp.1-25). Pretoria: HSRC Press.

210- Leat, M. J., & Lovell, M. J. (1997). Training needs analysis: weaknesses in the conventional approach. *Journal of European Industrial Training, 21* (4), pp. 143-53.

211- Leatherman, D. (2007). The training trilogy: conducting needs assessments designing programs training skills (3rd ed.). Amherst, MA: HRD Press.

212- Leedy, P.D., & Ormrod, J.E. (2005). *Practical research: planning and designing*, (8th ed.) UK.

213- Leigh, D., Watkins, R., Platt, W. A., & Kaufman, R. (2000). Alternate models of needs assessment: selecting the right one for your organization. *Human Resource Development Quarterly*, *11* (1), pp. 87-93.

214- Leskiw, L., &Singh, P. (2007). Leadership development: learning from best practices. *Journal of Leadership and Organization Development, 28* (5), pp. 444-464.

215- Leyds, R. F. (2005). *An organizational climate assessment in the faculty of law at the University of Pretoria* (Unpublished MBA thesis) Tshwane University of Technology Pretoria, South Africa.

216- Lim, H., Lee, S.G., and Nam, K. (2006). Validating E-learning factors affecting training effectiveness. *International Journal of Information Management*, 27 (2007), 22-35.

217- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

218- Liska, R., Weldzius, B. (2000). Attracting and maintaining a skilled construction. *Human Resource Development Quarterly, 12* (1), pp. 10-22

219- Liyange, C. L., Egbu, C.O., & Tookey, J. (2005). Research into facilities management in the health sector: a choice of research strategy. In *Proceedings of the 5th Postgraduate research conference : 13-15 April 2005, University of Salford*, (pp. 295-502). University of Salford, Salford.

220- Loosemore, M., Dainty, A., & Lingard, H. (2003). Human resource management in construction projects: strategic and operational approaches. London: Spon Press.

221- Love, P. E. D., Haynes, N. S., & Irani, Z. (2001). Construction managers' expectations and observations of graduates. *Journal of Managerial Psychology, 16* (8), pp. 579-593.

222- Love, P., Haynes, N.S., Sohal, A.S., Chan, A.P.C. and Tam, C.M. (2002), *Key Construction Management Skills for Future Success*, Faculty of Business and Economics, Monash University, Australia.

223- Luoma, M. (2000). Developing people for business success: capability-driven HRD in practice. *Management Decision, 38* (3), pp. 145-153.

224- Mackenzie, S., Kilpatrick, A. R., & Akintoye, A. (2000). UK construction skills shortage: response strategies and the analysis of industry perceptions. *Construction Management & Economics*,pp. 853-862.

225- Mager, R.F. (1996). Morphing into a....21st century trainer. Training (June 1996): 47-57

226- Maglen, L., Hopkins, S., & Burke, G. (2001). Training for productivity. Australian National Training Authority.pp 360 -380.

227- Majeed, Z. (2009) A review of HR practices in knowledge-intensive firms and MNEs: 2000-2006 *Journal of European Industrial Training,* Vol.33 No. 5, pp 439-456

228- Managing Training & Development (2005). E-learning tops the list of cost-control strategies. *Managing Training & Development, 5* (2), pp. 1-4.

229- Maqsood, T., Finegan, A., & Walker, D. H. T. (2007). Facilitating knowledge pull to deliver innovation through knowledge management: a case study. *Engineering Construction & Architectural Management, 14* (1), pp. 94-109.

230- Marr, B., & Schiuma, G. (2003). Business performance measurement: past, present and future. *Management Decisions, 41* (8), pp. 680-687.

231- Marzouk, M. (2009). Assessment of construction workforce skills needs in Egypt. *International Journal of Project Organization and Management, 1* No.

232- Mathews, B. P., Ueno, A., Kekale, T., Repka, M., Pereira, Z. L., & Silva, G. (2001). Quality training: needs and evaluation - findings from a European survey. *Total Quality Management & Business Excellence, 12* (4), pp. 483-490.

233- Mauzy, J., Harriman, R., & Arthur, K. A., (2003). *Creativity Inc.: Building an Inventive Organization.* Boston MA: Harvard Business School Press.

234- McClelland, S. B. (1994a). Training needs assessment data-gathering methods: part 1, survey questionnaire. *Journal of European Industrial Training, 18* (1), pp. 22-26.

235- McClelland, S. D., (2002). *A training needs assessment for the united way of Dunn County Wisconsin.* (Unpublished Master dissertation), University of Wisconsin-Stout, Menomonie, WI.

236- McConnell, J. (2003). How to identify your organisation's training needs: a practical guide to needs analysis. *American Management Association,* AMACOM. USA.

237- McCoy, M., and Hargie, O. (2001). Evaluating evaluation implications for assessing quality. *International Journal of Health Care Quality Assurance,* 14 (7), 317-327

238- McCullough, M. (2011).Needs assessment literature review for the safe and drug free schools and communities department at CESA5. (Unpublished MSc thesis), University of Wisconsin-Stout, Menomonie, WI.

239- McGehee, W., & Thayer, P. W. (1961). *Training in business and industry*. New York, *John Wiley & Sons. McArdle, J. (1998). Community development. Resource Manual, 11, H3a-H3e.*

240- McNamara, C. (2008). *Employee Training and Development: Reasons and Benefits.* Retrieved from http://managementhelp.org/trng_dev/basics/reasons.htm 646

241- Merrit, F. S., Loftin, M. K., & Ricketts, J. T. (1996). *Standard Handbook for Civil Engineers* (4th ed.). America: McGraw-Hill.

242- Mhlanga, E. (2008). *Quality assurance in higher education in Southern Africa: the case of the universities of the Witwatersrand, Zimbabwe and Botswana.* (Unpublished PhD thesis), University of the Witwatersrand, Johannesburg, South Africa.

243- Miller, J. & Osinski, D**.** (1996, Feb.). Training needs assessment. Retrieved Jan. 26, 2010, from http://www.ispi.org/pdf/ suggested Reading/Miller_Osinski.pdf.

244- Miller, L., (2002). *Perception of training and non-training managers of organizational impact measures based on design intent.* (Unpublished PhD thesis), North Carolina State University, North Carolina.

245- Miller, M. B. (1995). Structural equation modeling. Retrieved from http://www2.chass.ncsu/garson/PA765/standard.htm/

246- Mohamed, S. F. (2006). *Improving construction site management practices though knowledge management.* (PhD thesis), Loughborough University, Loughborough.

247- Mohamed, S. F., & Anumba, C. J. (2006). Potential for improving site management practices through knowledge management. *Construction Innovation: Information, Process, Management, 6* (4) pp. 232-249.

248- Moore, D., McCabe, G., Duckworth, W. III, & Sclove, S. L. (2003). *The practice of business statistics.* New York: Freeman.

249- Morano, R. (1973). Determining organizational training needs. *Personnel Psychology, 26* (4), pp. 479-87.

250- Morriss, R. C. (2009). Effectiveness measurement of a training program developed for supervising discipline engineers. A thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in the Department of Civil, Construction, and Environmental Engineering in the Graduate School of The University of Alabama.

251- Moy, J. & McDonald, R. (2000). *Analysing enterprise returns on training.* Canberra: Australian National Training Authority Publications.

252- Mselle, P.C. (2000). The need for training of site managers in Botswana 2nd International Conference in Construction in Developing Countries.

253- Mufeed, S. A., & Naila, K. (2009). An easier look on training needs assessment systems in the banking sector: an empirical study. International Conference on Human Resource Development.UK

254- Mullins, L. J. (2007). *Management and organizational behaviour* (7th ed.). Essex: Pearson Education.

255- Muya, A. D. F., & Edum, F. T. (2007). Training levy to support construction craft skills training in Zambia. *West Indian Journal of Engineering, 30* (1), pp. 37-44.

256- Muya, M., Mulenga, M. N., Bwalya, D. C., Edum-Fotwe, F. T., & Price, A. D. F. (2003). Construction skills requirement issues in Zambia. In D. J. Greenwood, (Ed.) *Proceedings 19th Annual ARCOM Conference, 3–5 September 2003, Association of Researchers in Construction Management, University of Brighton.*, (Vol.1, pp. 279-286). University of Brighton, Brighton.

257- Muya, M., Mulenga, M. N., Bwalya, D. C., Edum-Fotwe, F. T., & Price, A. D. F. (2004). Long period analysis of construction skill supply in Zambia. In F. Khosrowshahi, (Ed.) *20th Annual ARCOM Conference, 1-3 September 2004, Association of Researchers in Construction Management, Edinburgh, UK* (Vol. 1, pp. 67-76). Edinburgh.

258- Myers, M. (2009). *Qualitative Research in Business and Management*. London: Sage.

259- Nahiduzzaman, K. M. (2006). *Housing the Urban Poor: Planning, Business and Politics.* (Unpublished M. phil. thesis). Norwegian University of Science and Technology, Trondheim, Norway.

260- Naoum, S.G., (1998). *Dissertation research and writing: for construction students*. Oxford: Butterworth-Heinemann.

261- Nissen, B. (2006). *Training for the workforce of the future: advantages or disadvantages of using registered apprentices in two county GOB projects.*(thesis?) Research Institute on Social and Economic Policy, Florida International University.

262- Noe, R. (1999). *Employee training and development*. Irwin, McGraw-Hill.

263- Noe, R. (2002). *Employee training and* development (2nded.). New York, NY: McGraw-Hill Higher Education.

264- Noe, R. A. (2001). *Employee training & development* (2nd ed.). London: McGraw-Hill

265- Noe, R. A., Hollenbeck, J. H., Gerhart, B. & Wright, P. (1997). Human resource management, 2nd edition. McGraw-Hil

266- Noe, R. A., Hollenbeck, J. R., Gerhart, B., and Wright, P. M. (2006). *Human resource management: gaining a competitive advantage* (6th ed.). Boston: MA: McGraw-Hill Irwin.

267- Noe, R.A. (2005). Employee training and development. McGraw Hill, Singapore: 97-105.

268- Noe, R.A. (1999). Employee Training and Development (1st ed.). Burr Ridge, IL: Irwin McGraw-Hill.

269- Obiegbu, M. E. (1991). Duties and responsibilities of the site agent. In B. Olateju, (Ed.), *Effective contract management in the construction industry* (pp. 24-36). Nigerian Institute of Building, Lagos.

270- Odusami, K. T. (2001). *Project team leadership and construction project performance in some selected states in Nigeria*. (Unpublished PhD thesis). University of Lagos, Lagos, Nigeria.

271- Odusami, K. T. (2002). Perception of construction professionals concerning important skills of effective project leaders. *Journal of Management and Engineering, 18* (2), pp.

272- Odusami, K. T., & Ameh, O. J. (2006). Nigerian construction project managers' educational level and needs in project management. In *Proceedings of the International conference on the built environment in the 21st Century : 13- 15 June 2006 Kuala Lumpur, Malaysia* (pp. 59-69). Kuala Lumpur, Malaysia.

273- Odusami, K.T., Oyediran, O. S., & Oseni, A. O. (2007). Training needs of construction site managers. *Emirates Journal for Engineering Research, 12* (1), pp.73-81.

274- Ofori, G. (1994). Construction technology development: role of an appropriate policy. *Engineering, Construction and Architectural Management, 1* (2), pp.147-168.

275- Olomolaiye, A., & Egbu, C. (2005). Training needs in the management of human resources for knowledge management. In: Khosrowshahi, F. (ed.), 21st Annual ARCOM Conference, 7-9 September **2005**, School of Oriental and African Studies

276- Olomolaiye, A., & Egbu, C. (2006). Linking human resource management and knowledge management for performance improvements: a case study approach. In *Conference proceedings of COBRA 7-8 September 2006, University College London*.

277- Oppenheim, A. (1992). *Questionnaire design, interviewing and attitude measurement*, London: Pinter Publishers.

278- Orpen, C. (1999). The influence of the training environment on trainee motivation and perceived training quality. *International Journal of Training and Development, 3* (1), pp. 34-43.

279- Paek, J., & Hawley, J. (2006). A study of training program characteristics and training program effectiveness among organizations receiving training services from external training providers. In *proceedings of the International Research Conference, Academy of Human Resource Development.*

280- Pappas, M. P. (2004). *An assessment of implementation requirements for the tier II construction workforce strategy*. (Unpublished PhD thesis), University of Texas, Austin, Texas.

281- Pathirage, C. P., Amaratunga, R. D. G., & Haigh, R. (2005). Knowledge management research within the built environment: research methodological perspective, In *Proceedings of the5th International Postgraduate Research Conference, 14-15 April 2005,*

282- Pathirage, C. P., Amaratunga, R. D. G., & Haigh, R. P. (2005). Recognising the importance of "tacit" skills of the construction worker in a knowledge environment. In *Proceedings of the ARCOM doctoral workshop on skills, training and development in the construction industry, 30 November2005, Northumbria University* (pp. 1-6). Northumbria University, Newcastle.

283- Pathirage, C. P., Amaratunga, R. D. G., & Haigh, R.P. (2008). The role of philosophical context in the development of theory: towards methodological pluralism. *The Built & Human Environment Review, 1*

284- Patton, M. Q. (2002). *Qualitative Evaluation and Research Methods* (3rd ed.). Thousand Oak, CA: Sage Publications, Inc.

285- Patton, W.D., & Pratt, C. (2002). Assessing the training needs of high-potential managers. *Public Personnel Management, 31* (4), pp. 465-84.

286- Persson, M. (2010). Developing and Managing Knowledge of Construction Methods in the Swedish Building Sector **.** Halmstad University Halmstad, Sweden.

287- Phillimore, J., & Goodson, J. (2004). *Qualitative research in tourism: ontologies, epistemologies and methodologies.* London: Routledge.

288- Phillips, J. L., & Phillips, P. P. (2001). Symposium on the evaluation of training: editorial. *International Journal of Training and Development, 5* (4), pp. 240-247.

289- Phillips, J. L., & Phillips, P. P. (2002). *Reasons why training & development fails...and what you can do about it.* Retrieved from http://www.allbusiness.com/services/educational-services/4281026-1.html

290- Piro, A. M. (2003). *Product branding and consumer awareness*. (Unpublished DBA thesis), University of Natal, South Africa.

291- Pollack, J. (2007). The changing paradigms of project management. *International Journal of Project Management, 25* pp. 266-274.

292- Poon, J. M. L., & Rozhan, (2000). Management training and development practices of Malaysian organizations. *Malaysian Management Review, 35* (2), pp. 77-84.

293- Pratiwi, .H A., & Niam, M. F. (2012). Improving skill’s strategies of Indonesian construction labourers to have global competitiveness. *International Journal of Civil and Structural Engineering, 3* (1/ 2), pp. 345-360

294- Price (2009) the conception and operationalization of leadership in construction companies. (Unpublished research report),University of South Africa, Pretoria.

295- Proverbs, D. G., Holt, G. D., & Cheok, H. Y. (2000). Construction industry problems: the views of UK construction directors. In A. Akintoye, (Ed.), *Proceedings of the16th Annual ARCOM Conference : 6-8 September 2000, Association of Researchers in Construction Management, Glasgow Caledonian University*., (Vol. 1, pp. 73-81). Glasgow Caledonian University, Glasgow.

296- Putt, T. A. (1998). Continuing education for building and construction professionals. In J. Yang, & W. P. Chang, (Eds.), *Building education and research*. Newcastle: E & F N Spon.

297- Rae, L. (2000). *Effective planning in training and development*. London: British Library.

298- RAM, (2004), Construction Industry Market Review 2003. Retrieved from www.researchandmarkets.com/reportinfo.asp?cat_id=0&report_id=34791

299- Ray and Mondal, (1999). Research methods in Social Sciences and Extension Education-G.L. Kalyani Publishers.

300- Reed, J., & Vakola, M. (2006). What role can a training needs analysis play in organizational change? *Journal of Organizational Change Management, 19* (3), pp. 393-407.

301- Rees, C. J., Jarvalt, J., & Metcalfe, B. (2005). Career management in transition: HRD themes from the Estonian civil service. *Journal of European Industrial Training, 29* (7), pp. 572-92.

302- Remenyi, D., *et al*. (2003). *Doing research in business and management: an introduction to process and methods.* London: Sage Publications.

303- Remenyi, D., Williams, B., Money, A., & Swatz, E. (1998). *Doing research in business and management.* London: Sage.

304- Renzl, B. (2006). Trust in management and knowledge sharing: the mediating effects of fear and knowledge documentation. *Omega, 36* (2), pp. 206-222.

305- Research Methodology: An Introduction available at http://www.newagepublishers.com/samplechapter/000896.pdf (Jun ,2012) .

306- Ribeiro, F. L. (2008). Knowledge management in construction sites. *Emirates Journal for Engineering Research, 13* (2), pp. 1-9.

307- Ribeiro, F. L., Leitão, V., & Ferreira, T. (2010). Using knowledge to improve preparation of construction projects. *Business Process Management Journal, 16* (3), pp. 361-376.

308- Ribeiro, F.L. (2006). Can shared knowledge bases support knowledge management systems in construction. In *Proceedings of Building on IT – Joint International Conference on Computing and Decision Making in Civil and Building Engineering, when? CIB W102, Canada.*

309- Robson, C. (2002). *Real world research* (2nd ed.). Oxford: Blackwell publications.

310- Rossilah, J. Hishamuddin Md.Som (2007). Training needs analysis: practices of top companies in Malaysia. *International Review of Business Research, 3* (3), pp.162-175.

311- Sandwith, P. (1993). A hierarchy of management training requirements: the competency domain model. *Public Personnel Management, 22* (1), pp. 43-62.

312- Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students. 6th ed.* England: Pearson – Chapter 4.

313- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research methods for business students* (4th ed.). London: Prentice Hall..

314- Schneier, C. E., Guthrie, J. P., & Olian, J.D. (1988) A practical approach to conducting and using the training needs assessment. *Public Personnel Management, 17* (2), pp. 191-205.

315- Seethamraju, R., & Agrawal, R. (1999*). Engineering as manager: a conceptual model of transition*.(pp. 293-297). Parramatta, Australia:

316- Sega, M. (2006). *Training and needs assessment technique improvement in customer service through a field observation study*. (published MSc paper)

317- Sekaran, U. (2003). *Research methods for business: a skill building approach* (4th ed.). New York: John Wiley and Sons.

318- Sexton, M. (2004). *Axiological purposes, ontological cages and epistemological keys*. Paper Presented at the Postgraduate research workshop. University of Salford, Salford.

319- Shaban, S. (2008). *Factors affecting the performance of construction projects in the Gaza strip*. *Gaza Strip: Islamic University of Gaza*. Master of Science in Construction Management**.**

320- Shah, S., & Burke, G. (2003). *Skills shortages: concepts, measurement and implications.* Centre for the Economics of Education and Training, Australia: Monash University, Australia.

321- Sharma, R. D. (1992). Lack of management training in India: causes and characteristics. *International Journal of Manpower, 13* (3), pp. 27-34/310.

322- Shehu, Z., & Akintoye, A. (2008). Construction programme management skills and competencies: a deeper insight.

323- Shehu, Z., & Ruiz, Y. (2004). Skills shortages in skilled construction and metal trade occupations. *Labour Market* pp. 103-112.

324- Sherazi, S. K., Ahmed, I., Iqbal, M., Umar, M., & Rehman, K. (2011). Training needs assessment practices in corporate sector of Pakistan. *African Journal of Business Management, 5* (28), pp. 11435-11441.

325- Skipper, C., & Bell, L. (2006). Leadership development of construction project managers.

326- Sleezer, C. M. (1993), Training needs assessment at work: A dynamic process. Human Resource Development Quarterly, 4: 247–264. doi: 10.1002/hrdq.3920040305

327- Sleezer, C. M. (1993). Training needs assessment at work: a dynamic process. *Human Resource Development Quarterly,* 4, 247–264.

328- Smyth, H. J., & Morris, P. W. G. (2007). An epistemological evaluation of research into projects and their management: methodological issues. *International Journal of Project Management, 25* ( ), pp. 423-436.

329- Snell, S. A., & Dean, J. W. (1992). Integrated manufacturing and human resource management: a human capital perspective. *Academy of Management Journal, 35* (3), pp. 467-504.

330- Sorenson, S.M. (2002). Training for the long run. *Engineered Systems, 19* (6), p. 32.

331- Sorrel, S. (1999). An investigation into the skills and training required by site managers in today's construction industry. (Unpublished BSc thesis) Sheffield Hallam University, Sheffield.

332- Spence, N. E. (1998). Needs assessment practices of managers and trainers. Doctoral dissertation, Drake University

333- Stake, R. (1995). *The art of case research.* Thousand Oaks, CA: Sage Publications.

334- Steele, J. L. (2000). *The interdisciplinary conceptual design of building.* (Unpublished PhD thesis),Loughborough University, Loughborough.

335- Sulaiman, W., & Ansar, M. (2009).*Benefits of training for both the organization and employees*. Retrieved from www.helium.com › Business › Human Resources

336- Sutrisna, M. (2009*) Research methodology in doctoral research: understanding the meaning of conducting qualitative research.* Presented at ARCOM Doctoral Workshop, Liverpool : 12 May 2009. John Moores University, Liverpool.

337- Tabassi, A. A., Ramli, M., & Bakar, A. A. (2011). Training and development of workforces in construction industry. *International Journal of Academic Research 3* (4), pp. 509-515.

338- Tan, Han Leng (2005) *Human resource planning and human resource development in construction.* Master' thesis, Universiti Teknologi Malaysia, Faculty of Civil Engineering.

339- Tao, Y., Yeh, C. R., & Sun, S. (2006). Improving training needs assessment processes via the Internet: system design and qualitative study. *Internet Research, 16* (4), pp. 427-49.

340- Taylor, P. J., O'Driscoll, M. P., & Binning, J. F. (1998). A new integrated framework for training needs analysis. *Human Resource Management Journal, 8* (2), pp.29-50.

341- Teixeira, J. M. C., Minasowicz, A., Zavadskas, E.K., Ustinovichius, L., Migilinskas, D., Arminana, E.P., Nowak, P.O., & Grabiec, M. (2006). Training needs in construction project management: a survey of 4 countries of the EU. *Journal of Civil Engineering and Management, 7* (3), pp. 237-245.

342- Teixeira, J., & Pires, (2006). Training needs in construction project management in Portugal. International congress of project engineering .

343- Thomas, K. (2006). *Learner perspectives on the use of a learning management system in first year economic students.* (Unpublished PhD thesis), University of Pretoria. Pretoria.

344- Thompson, P., & Siddiqi, K. (2007). *Best practices for improving safety among Hispanic construction workers.* Presented at the International Conference of Associated Schools of Construction, Northern Arizona University, Flagstaff, Arizona.

345- Tobi, S. U. M.(2009) Social Enterprise Applications in an Urban Facilities Management Setting: Research Methodological Perspectives. In *Salford Postgraduate Annual Research Conference 7-8 May 2009* (p. 238).

346- Toni, T. (2009). Causes and consequences of the shortage of electrical artisans at Eskom. *Australian Journal of Basic and Applied Sciences, 7*(4), pp. 14-23.

347- Toor, S-u-R., & Ofori, G. (2008). Leadership for future construction industry: agenda for authentic leadership. *International Journal of Project Management, 26* , pp. 620-630.

348- Training Magazine, (1995). Retrieved from http://www.trainingmagnetwork.com/welcome/kendralee_jan21

349- Travers, M. (2001). *Qualitative research through case studies*. London: Sage publications.

350- Trejo, D., Patel, S., Andersen, S., & Cervantes, E. (2003). Framework for competency and capability assessment for resource allocation. *Journal of Management in Engineering, 18* (1), pp. 44–49.

351- Truelove, S. (2001). *Training in Practice*. Oxford: Blackwell Business

352- Tuchman, G. (1994). Historical social science: methodologies, methods and meanings.

353- Uhlmann, F. W. (1973). Training, the conspiracy against employees. *Public Personnel Management, 2* (5), pp. 342-344.

354- UN-Habitat (2006) *Iraq housing market study main report*. Prepared by PADCO In cooperation with Community Development Group Iraqi Central Office of Statistics & Information Technology.

355- UN-Habitat (2007) *Institutional and training needs assessment for establishing ministry of construction and housing knowledge and training centre.* Iraq.

356- Van Eerde, W., Tang, K., & Talbot, G. (2008). The mediating role of training utility in the relationship between training needs assessment and organizational effectiveness. *The International Journal of Human Resource Management, 19* (1), pp. 63-73.

357- Vijayalakshmi, (2012). Training in banking sector: a study to identify training needs among employees in public sector bank. : M*anagement Issues in Emerging Economies (ICMIEE), Conference Proceedings of 2012 International Conference on*.

358- Virmani, B.R. (2000). *Managing people in organizations: the challenges of change.* New Delhi: Sage Publications.

359- Wagonhurst, C. (2002). Effective training programs. *Journal of Research Administration, 33* (2/3), pp. 77-81.

360- Wahab, K. A. (1991). Satisfying the training needs of management and staff in the construction industry. In B. Olateju, (Ed.), *Effective contract management in the construction industry* (pp. 82-85). Lagos: Nigerian Institute of Building.

361- Walliman, N. (2001). *Your research project: a step-by –step guide for the first time researcher.* UK, Sage Publications.

362- Wang, Y. (2008). A quantitative analysis of training outcome and strategies in the construction industry. Yinggang Wang University of Kentucky.

363- Welch, T. (1998). *Construction industry faces up to skills crisis" UK".* CIOB Publication.

364- Wilkins, S. (2001). Management development in the Arab Gulf States: The influence of language and culture. *Industrial and Commercial Training, 33* (7), pp. 260-266.

365- Winch, G. (2009). Managing construction projects: an information processing approach. John Wiley and Sons, pp. 346-377. Work Force, Research Summary 135-1, Construction Industry Institute (CII), the University 274 of Texas at Austin.

366- Yaakub, H. (1996). The implementation of training needs assessment among training managers in selected private organization in Malaysia.

367- Yin, R. K. (1994). *Case Study Research: Design and Methods* (2nd ed.) London, Sage Publications.

368- Yin, R. K. (2003). *Case study research: design and methods* (3rd ed.). London: Sage Publications.

369- Yin, R. K. (2003a) *Applications of Case Study Research.* (2nd Ed.). Thousand Oaks, CA: Sage Publications, Inc.

370- Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage.

371- Young, B. A. (1989). Management skills and knowledge: a case example from the construction industry. *Leadership & Organization Development Journal, 10* (6), pp. 3-9.

372- Zikmund, W.G. (2003). *Business research methods* (7th Ed.). UK Thomson Learning.

Appendices

Appendix 1

Table 1: TNA methods advantage and disadvantage

Tool	Method	Advantages	Disadvantage
Surveys / Questionnaires	May be in the form of surveys or polls of a random or stratified sample or an entire population. Can use a variety of question formats: Open ended, projective, forced-choice, priority ranking	Can reach a large number of people in a short time. Are inexpensive. Give opportunity of response without fear of embarrassment. Yield data easily summarized and reported	Make little provision for free response. Require substantial time for development of effective survey or questionnaire. Do not effectively get at causes of problems or possible solutions
Interviews	Can be formal or casual, structured or unstructured. May be used with a representative sample or whole group. Can be done in person, by phone, at the work site, or away from it	Uncover attitudes, causes of problems, and possible solutions. Gather feedback; yield of data is rich. Allow for spontaneous feedback	Are usually time consuming. Can be difficult to analyse and quantify results. Need a skilful interviewer who can generate data without making interviewee self-conscious or suspicious
Performance appraisals	May be conducted informally or systematically. Conducted by manager; appraisal developed by HR. Should be conducted on a regular basis and separately from merit	Indicate strengths and weakness in skills and identify training and development needs. Can also point out candidates for merit raises or promotions.	Can be costly to develop the system, implement the appraisals, and process the results. May enable managers to manipulate ratings to justify a pay raise.

	discussions.		May invalidate the appraisal because of supervisor bias. May be prohibited for union employees
Observations	Can be technical, functional, or behavioural. Can yield qualitative or quantitative feedback. May be unstructured	Minimize interruption of routine work flow or group activity. Generate real-life data.	Requires a highly skilled observer with process and content knowledge. Allow data collection only in the work setting. May cause “spied on” feelings
Tests	Can be functionally oriented to test a board, staff, or committee member’s understanding	Can be helpful in determining deficiencies in terms of knowledge, skills, or attitudes. Easily quantifiable and comparable	Must be constructed for the audience, and validity can be questionable. Do not indicate if measured knowledge and skills are actually being used on the job.
Assessment Centres	For management development. Require participants to complete a battery of exercises to determine areas of strength that need development. Assess potential by having people work in simulated management situations	Can provide early identification of people with potential for advancement. More accurate than “intuition.” Reduce bias and increase objectivity in selection process	Selecting people to be included in the high potential process difficult with no hard criteria available. Are time-consuming and costly to administer. May be used to diagnose developmental needs rather than high potential
Focus groups / group	Can be formal or informal. Widely used	Allow interaction	Are time-consuming for both consultants

discussion	method. Can be focused on a specific problem, goal, task, or theme.	between viewpoints. Enhance "buy-in"; focus on consensus. Help group members become better listeners, analysers, problem solvers	and group members. Can produce data that is difficult to quantify
Document reviews	Organizational charts, planning documents, policy manuals, audits, and budget reports.	Provide clues to trouble spots. Provide objective evidence or results. Can easily be collected and compiled	Often do not indicate causes of problems or solutions. Reflect the past rather than the current situation. Must be interpreted by skilled data analysts.
Advisory Committees	Secure information from people who are in a position to know the training needs of a particular group. Supply data gathered from consultants by using techniques such as interviews, group discussions, and questionnaires	Are simple and inexpensive. Permit input and interaction of a number of individuals with personal views of the group's needs. Establish and strengthen lines of communication	Carry biased organizational perspective. May not represent the complete picture because the information is from a group that is not representative of the target audience

Figure 1.3 Source: Adapted from *Managing a Small HRD Department*, by Carol P. McCoy. Falmouth, ME: *O* McCoy Training and Development Resources, 1993, p. 23.

Appendix 2

Table 2: (Post Hoc Tests) Multiple Comparisons of Construction Site Management Problems.

Dependent Variable	(I) position in your company	(J) position in your company	Mean Difference (I-J)	Std. Error	Sig.
Technical Problems	Site manager	Civil engineer	-.95679*	.10229	.000
		Project leader	.20988	.12519	.095
		Architect	-.73265*	.10427	.000
	Civil engineer	Site manager	.95679*	.10229	.000
		Project leader	1.16667*	.13062	.000
		Architect	.22414*	.11074	.044
	Project leader	Site manager	-.20988	.12519	.095
		Civil engineer	-1.16667*	.13062	.000
		Architect	-.94253*	.13218	.000
	Architect	Site manager	.73265*	.10427	.000
		Civil engineer	-.22414*	.11074	.044
		Project leader	.94253*	.13218	.000
Poor Communication	Site manager	Civil engineer	.25953*	.08761	.003
		Project leader	.25905*	.10828	.018
		Architect	.42724*	.08923	.000
	Civil engineer	Site manager	-.25953*	.08761	.003
		Project leader	-.00047	.11256	.997
		Architect	.16771	.09439	.077
	Project leader	Site manager	-.25905*	.10828	.018
		Civil engineer	.00047	.11256	.997
		Architect	.16818	.11383	.141
	Architect	Site manager	-.42724*	.08923	.000
		Civil engineer	-.16771	.09439	.077
		Project leader	-.16818	.11383	.141

Site Management Administration Problems	Site manager	Civil engineer	.54688*	.09872	.000
		Project leader	-.19697	.12202	.108
		Architect	.50000*	.10056	.000
	Civil engineer	Site manager	-.54688*	.09872	.000
		Project leader	-.74384*	.12685	.000
		Architect	-.04688	.10636	.660
	Project leader	Site manager	.19697	.12202	.108
		Civil engineer	.74384*	.12685	.000
		Architect	.69697*	.12828	.000
	Architect	Site manager	-.50000*	.10056	.000
		Civil engineer	.04688	.10636	.660
		Project leader	-.69697*	.12828	.000
Shortage of skilled and knowledgeable workers	Site manager	Civil engineer	-.64063*	.12165	.000
		Project leader	.12500	.15202	.412
		Architect	-1.06667*	.12390	.000
	Civil engineer	Site manager	.64063*	.12165	.000
		Project leader	.76563*	.15790	.000
		Architect	-.42604*	.13106	.001
	Project leader	Site manager	-.12500	.15202	.412
		Civil engineer	-.76563*	.15790	.000
		Architect	-1.19167*	.15965	.000
	Architect	Site manager	1.06667*	.12390	.000
		Civil engineer	.42604*	.13106	.001
		Project leader	1.19167*	.15965	.000
(*. The mean difference is significant at the 0.05 level)					

Appendix 3

Table 3 : (Post Hoc Tests) Multiple Comparison for Training Needs Indicator

Dependent Variable	(I) position in your company	(J) your position in your company	Mean Difference (I-J)	Std. Error	Sig.
1- Development of employee skills to fill a current need	Site manager	Civil engineer	-.29268*	.11900	.015
		Project leader	-.14117	.14708	.338
		Architect	-.69268*	.12121	.000
	Civil engineer	Site manager	.29268*	.11900	.015
		Project leader	.15152	.15290	.323
		Architect	-.40000*	.12821	.002
	Project leader engineering	Site manager	.14117	.14708	.338
		Civil engineer	-.15152	.15290	.323
		Architect	-.55152*	.15462	.000
	Architect	Site manager	.69268*	.12121	.000
		Civil engineer	.40000*	.12821	.002
		Project leader	.55152*	.15462	.000
2- Career development	Site manager	Civil engineer	-.41273*	.10284	.000
		Project leader	.43718*	.12711	.001
		Architect	-.18252	.10475	.083
	Civil engineer	Site manager	.41273*	.10284	.000
		Project leader	.84991*	.13214	.000
		Architect	.23021*	.11080	.039
	Project leader engineering	Site manager	-.43718*	.12711	.001
		Civil engineer	-.84991*	.13214	.000
		Architect	-.61970*	.13363	.000
	Architect	Site manager	.18252	.10475	.083
		Civil engineer	-.23021*	.11080	.039
		Project leader	.61970*	.13363	.000
3- Organizational problems	Site manager	Civil engineer	.21608*	.09426	.023
		Project leader	.21656	.11651	.064

		Architect	.49837*	.09601	.000
	Civil engineer	Site manager	-.21608*	.09426	.023
		Project leader	.00047	.12112	.997
		Architect	.28229*	.10156	.006
	Project leader engineering	Site manager	-.21656	.11651	.064
		Civil engineer	-.00047	.12112	.997
		Architect	.28182*	.12248	.022
	Architect	Site manager	-.49837*	.09601	.000
		Civil engineer	-.28229*	.10156	.006
		Project leader	-.28182*	.12248	.022
4- New changes in work environment	Site manager	Civil engineer	1.00495*	.11415	.000
		Project leader	-.89135*	.14108	.000
		Architect	1.24350*	.11626	.000
	Civil engineer	Site manager	-1.00495*	.11415	.000
		Project leader	-1.89631*	.14666	.000
		Architect	.23854	.12298	.054
	Project leader engineering	Site manager	.89135*	.14108	.000
		Civil engineer	1.89631*	.14666	.000
		Architect	2.13485*	.14832	.000
	Architect	Site manager	-1.24350*	.11626	.000
		Civil engineer	-.23854	.12298	.054
		Project leader	-2.13485*	.14832	.000

*. The mean difference is significant at the 0.05 level

Appendix 4

Table 4: Multiple Comparisons for barriers to training needs

Dependent Variable	(I) position in your company	Company	Mean Difference (I-J)	Std. Error	Sig.
1-Lack of financial resources;	Site manager	Civil engineer	-.47637*	.12858	.000
		Project leader	-.01330	.15892	.933
		Architect	-.32846*	.13097	.013
	Civil engineer	Site manager	.47637*	.12858	.000
		Project leader	.46307*	.16521	.005
		Architect	-1.24350*	.13853	.000
	Project leader engineering	Site manager	.01330	.15892	.933
		Civil engineer	-.46307*	.16521	.005
		Architect	.89135*	.16707	.006
	Architect	Site manager	.32846*	.13097	.013
		Civil engineer	1.24350*	.13853	.000
		Project leader	.-89135*	.16707	.006
2-Lack of adequate expertise	Site manager	Civil engineer	.13338	.10441	.203
		Project leader	-.10052	.12904	.437
		Architect	-.08537	.10634	.423
	Civil engineer	Site manager	-.13338	.10441	.203
		Project leader	-.23390	.13415	.083
		Architect	-.21875	.11249	.053
	Project leader engineering	Site manager	.10052	.12904	.437
		Civil engineer	.23390	.13415	.083
		Architect	.01515	.13566	.911
	Architect	Site manager	.08537	.10634	.423
		Civil engineer	.21875	.11249	.053
		Project leader	-.01515	.13566	.911
3-Lack of job descriptions	Site manager	Civil engineer	.10823	.10657	.311
		Project leader	.33740*	.13171	.011

		Architect	.23740*	.10854	.030
	Civil engineer	Site manager	-.10823	.10657	.311
		Project leader	.22917	.13692	.096
		Architect	.12917	.11481	.262
	Project leader engineering	Site manager	-.33740*	.13171	.011
		Civil engineer	-.22917	.13692	.096
		Architect	-.10000	.13847	.471
	Architect	Site manager	-.23740*	.10854	.030
		Civil engineer	-.12917	.11481	.262
		Project leader	.10000	.13847	.471
4-Unsystematic training approaches	Site manager	Civil engineer	.66730*	.13121	.000
		Project leader	.69808*	.16217	.000
		Architect	.64959*	.13364	.000
	Civil engineer	Site manager	-.66730*	.13121	.000
		Project leader	.03078	.16858	.855
		Architect	-.01771	.14136	.900
	Project leader engineering	Site manager	-.69808*	.16217	.000
		Civil engineer	-.03078	.16858	.855
		Architect	-.04848	.17048	.776
	Architect	Site manager	-.64959*	.13364	.000
		Civil engineer	.01771	.14136	.900
		Project leader	.04848	.17048	.776
5-Lack of support from top management	Site manager	Civil engineer	-.36662*	.09954	.000
		Project leader	.29342*	.12302	.018
		Architect	-.25203*	.10138	.014
	Civil engineer	Site manager	.36662*	.09954	.000
		Project leader	.66004*	.12789	.000
		Architect	.11458	.10724	.286
	Project leader engineering	Site manager	-.29342*	.12302	.018
		Civil engineer	-.66004*	.12789	.000
		Architect	-.54545*	.12933	.000

	Architect	Site manager	.25203*	.10138	.014
		Civil engineer	-.11458	.10724	.286
		Project leader	.54545*	.12933	.000
6-Lack of new workers interested in skills development programmes	Site manager	Civil engineer	-.06517	.11834	.582
		Project leader	-.14708	.14627	.316
		Architect	-.10163	.12054	.400
	Civil engineer	Site manager	.06517	.11834	.582
		Project leader	-.08191	.15206	.591
		Architect	-.03646	.12750	.775
	Project leader engineering	Site manager	.14708	.14627	.316
		Civil engineer	.08191	.15206	.591
		Architect	.04545	.15377	.768
	Architect	Site manager	.10163	.12054	.400
		Civil engineer	.03646	.12750	.775
		Project leader	-.04545	.15377	.768
7- Wasting of time	Site manager	Civil engineer	.11738	.13692	.392
		Project leader	-.87694*	.16923	.000
		Architect	.13821	.13946	.323
	Civil engineer	Site manager	-.11738	.13692	.392
		Project leader	-.99432*	.17593	.000
		Architect	.02083	.14752	.888
	Project leader engineering	Site manager	.87694*	.16923	.000
		Civil engineer	.99432*	.17593	.000
		Architect	1.01515*	.17791	.000
	Architect	Site manager	-.13821	.13946	.323
		Civil engineer	-.02083	.14752	.888
		Project leader	-1.01515*	.17791	.000

*The mean difference is significant at the 0.05 level

Appendix 5

Table 5: One-Sample Kolmogorov-Smirnov Test for construction site management problems

What is your position in your company?			Technical problems	Poor communication	Management and Administration Problems	Shortage of skilled and knowledge workers
Site manager	N		81	82	82	82
	Normal Parameters[a,b]	Mean	3.5432	4.7439	4.5000	3.5000
		Std. Deviation	.61338	.43916	.54997	.72436
	Most Extreme Differences	Absolute	.327	.464	.343	.292
		Positive	.257	.280	.294	.292
		Negative	-.327	-.464	-.343	-.218
	Kolmogorov-Smirnov Z		2.946	4.202	3.104	2.640
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000
Civil engineer	N		62	64	64	64
	Normal Parameters[a,b]	Mean	3.9531	4.4844	4.5000	4.1406
		Std. Deviation	.59368	.53429	.65295	.83318
	Most Extreme Differences	Absolute	.349	.333	.294	.255
		Positive	.252	.318	.284	.164
		Negative	-.349	-.333	-.294	-.255

	Kolmogorov-Smirnov Z		2.744	2.662	2.354	2.041
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000
Project leader engineering	N		33	33	33	32
	Normal Parameters[a,b]	Mean	3.3333	4.4848	4.6970	3.3750
		Std. Deviation	.59512	.56575	.46669	.70711
	Most Extreme Differences	Absolute	.379	.334	.439	.327
		Positive	.379	.289	.258	.327
		Negative	-.257	-.334	-.439	-.235
	Kolmogorov-Smirnov Z		2.177	1.918	2.521	1.850
	Asymp. Sig. (2-tailed)		.000	.001	.000	.002
Architect	N		58	60	60	60
	Normal Parameters[a,b]	Mean	4.2759	4.3167	4.0000	4.5667
		Std. Deviation	.61539	.59636	.63779	.62073
	Most Extreme Differences	Absolute	.311	.319	.333	.391
		Positive	.311	.319	.317	.243
		Negative	-.242	-.257	-.333	-.391
	Kolmogorov-Smirnov Z		2.368	2.471	2.582	3.027
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000

Appendix 6

Table 6: One-Sample Kolmogorov-Smirnov Test for training needs indictors

a. Test distribution is Normal. b. Calculated from data.

What is your position in your company			1- Installation of new equipment	2- career development	3- Organizational problems	4- Changes in work environment
Site manager	N		82	82	82	82
	Normal Parameters[a,b]	Mean	3.7073	3.1341	4.7317	3.9268
		Std. Deviation	.76154	.71599	.44580	.81317
	Most Extreme Differences	Absolute	.250	.294	.458	.243
		Positive	.250	.294	.274	.208
		Negative	-.223	-.255	-.458	-.243
	Kolmogorov-Smirnov Z		2.267	2.661	4.148	2.202
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000
Civil engineer	N		64	64	64	64
	Normal Parameters[a,b]	Mean	4.0000	3.5469	4.5156	2.9219
		Std. Deviation	.64242	.56145	.53429	.69704
	Most Extreme Differences	Absolute	.328	.337	.349	.284
		Positive	.313	.288	.301	.284

		Negative	-.328	-.337	-.349	-.279
	Kolmogorov-Smirnov Z		2.625	2.696	2.791	2.268
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000
Project leader engineering	N		33	33	33	33
	Normal Parameters[a,b]	Mean	3.8485	2.6970	4.5152	4.8182
		Std. Deviation	.71244	.52944	.66714	.39167
	Most Extreme Differences	Absolute	.251	.383	.372	.497
		Positive	.234	.253	.234	.321
		Negative	-.251	-.383	-.372	-.497
	Kolmogorov-Smirnov Z		1.441	2.201	2.139	2.855
	Asymp. Sig. (2-tailed)		.031	.000	.000	.000
Architect	N		60	60	60	60
	Normal Parameters[a,b]	Mean	4.4000	3.3167	4.2333	2.6833
		Std. Deviation	.71781	.56723	.67313	.59636
	Most Extreme Differences	Absolute	.315	.378	.269	.319
		Positive	.202	.378	.269	.257
		Negative	-.315	-.255	-.239	-.319
	Kolmogorov-Smirnov Z		2.440	2.931	2.083	2.471
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000

Appendix 7

Table 7: One-Sample Kolmogorov-Smirnov Test for Training needs barriers

What is your position in your company?			Lack of financial resources;	Lack of adequate expertise	Lack job descriptions	Unsystematic training approaches	Lack of support from top management	-Lack of new workers interested in skills development programs;	Wasting of times
Site manager	N		82	82	82	82	82	82	82
	Normal Parameters[a,b]	Mean	3.8049	4.4146	4.6707	4.1829	4.4146	2.7317	3.3049
		Std. Deviation	.79254	.64695	.58910	.83338	.66576	.75439	.76480
	Most Extreme Differences	Absolute	.248	.317	.431	.251	.323	.261	.338
		Positive	.248	.239	.288	.172	.221	.261	.338
		Negative	-.195	-.317	-.431	-.251	-.323	-.212	-.248
	Kolmogorov-Smirnov Z		2.241	2.873	3.907	2.275	2.921	2.362	3.059
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000
Civil engineer	N		64	64	64	64	64	64	64
	Normal Parameters[a,b]	Mean	4.2813	4.2813	4.5625	3.5156	4.7813	2.7969	3.1875
		Std. Deviation	.78617	.67774	.55990	.66648	.48693	.67093	.70991
	Most Extreme Differences	Absolute	.304	.270	.376	.327	.486	.275	.276

		Positive	.180	.270	.249	.327	.327	.240	.276
		Negative	-.304	-.246	-.376	-.219	-.486	-.275	-.240
	Kolmogorov-Smirnov Z		2.433	2.162	3.012	2.618	3.887	2.202	2.208
	Asymp. Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000
Project leader engineering	N		33	33	33	33	33	33	33
	Normal Parameters[a,b]	Mean	3.8182	4.5152	4.3333	3.4848	4.1212	2.8788	4.1818
		Std. Deviation	.72692	.56575	.77728	.75503	.64988	.73983	1.07397
	Most Extreme Differences	Absolute	.235	.350	.289	.285	.301	.232	.353
		Positive	.233	.273	.196	.285	.301	.223	.223
		Negative	-.235	-.350	-.289	-.207	-.275	-.232	-.353
	Kolmogorov-Smirnov Z		1.351	2.009	1.662	1.638	1.731	1.331	2.026
	Asymp. Sig. (2-tailed)		.052	.001	.008	.009	.005	.058	.001
Architect	N		60	60	60	60	60	60	60
	Normal Parameters[a,b]	Mean	4.1333	4.5000	4.4333	3.5333	4.6667	2.8333	3.1667
		Std. Deviation	.74712	.56748	.69786	.85304	.57244	.66808	.84706
	Most Extreme Differences	Absolute	.227	.344	.325	.234	.436	.282	.228
		Positive	.221	.278	.208	.234	.280	.251	.228
		Negative	-.227	-.344	-.325	-.208	-.436	-.282	-.189
	Kolmogorov-Smirnov Z		1.758	2.666	2.517	1.813	3.381	2.183	1.766

	Asymp. Sig. (2-tailed)	.004	.000	.000	.003	.000	.000	.004

a. Test distribution is Normal.

b. Calculated from data.

Appendix 8

Table 8: Independent Samples Test for the importance of TNA to Iraqi construction companies

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Training needs assessment play important role to ensure training effectiveness	Equal variances assumed	24.037	.000	-4.282	237	.000	-.28639	.06688	-.41814	-.15464
	Equal variances not assumed			-4.447	182.556	.000	-.28639	.06440	-.41345	-.15933
Training help to achieve organizational 's goals if it is based on training needs assessment of construction employees	Equal variances assumed	.578	.448	-1.360	237	.175	-.10160	.07470	-.24877	.04557
	Equal variances not assumed			-1.379	170.800	.170	-.10160	.07369	-.24706	.04386
TNA helps to achieve training cost effective	Equal variances assumed	.101	.751	-.513	237	.608	-.04264	.08312	-.20640	.12111
	Equal variances not assumed			-.513	164.559	.609	-.04264	.08310	-.20672	.12143
Training needs assessment help to manage change in your company	Equal variances assumed	2.449	.119	2.779	237	.006	.25695	.09246	.07481	.43909
	Equal variances not assumed			2.770	162.943	.006	.25695	.09276	.07379	.44011

TAN aim to improve workforces development professional and personal development respectively	Equal variances assumed	.867	.353	-1.877	237	.062	-.18774	.10002	-.38479	.00931
	Equal variances not assumed			-1.930	177.556	.055	-.18774	.09729	-.37975	.00426
Result of training needs assessment are used as gaudiness for career development	Equal variances assumed	14.318	.000	-8.751	237	.000	-.97879	.11185	-1.19913	-.75846
	Equal variances not assumed			-9.748	217.286	.000	-.97879	.10041	-1.17669	-.78090
Training needs assessment help to motivates constructions employees to learn in construction field	Equal variances assumed	30.496	.000	10.816	237	.000	1.08296	.10013	.88570	1.28021
	Equal variances not assumed			12.029	216.563	.000	1.08296	.09003	.90551	1.26041
TNA used for improving the trainees level of knowledge, skills, and attitude	Equal variances assumed	10.384	.001	9.699	237	.000	.92201	.09506	.73473	1.10929
	Equal variances not assumed			10.728	214.040	.000	.92201	.08595	.75260	1.09142

Appendix 9

Table 9: Independent Samples Test for the importance of skills for Iraqi constructions employees

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1- Technical Skills	Equal variances assumed	8.405	.004	-1.598	237	.111	-.11877	.07433	-.26519	.02766
	Equal variances not assumed			-1.680	188.899	.095	-.11877	.07068	-.25818	.02065
2-Project Management Skills	Equal variances assumed	3.742	.054	-.936	237	.350	-.05274	.05635	-.16375	.05827
	Equal variances not assumed			-.963	177.917	.337	-.05274	.05477	-.16083	.05534
3-Conceptual skill	Equal variances assumed	.017	.898	3.814	237	.000	.31148	.08166	.15061	.47235
	Equal variances not assumed			3.989	186.010	.000	.31148	.07809	.15742	.46554
4- enterprise skills	Equal variances assumed	.758	.385	3.732	237	.000	.32981	.08839	.15569	.50393

	Equal variances not assumed			3.909	186.970	.000	.32981	.08437	.16338	.49624
5-Business Skills	Equal variances assumed	11.673	.001	3.927	237	.000	.33082	.08423	.16488	.49677
	Equal variances not assumed			4.036	177.366	.000	.33082	.08197	.16907	.49258
6-Interpersonal Skills	Equal variances assumed	.526	.469	-1.042	237	.298	-.09795	.09399	-.28312	.08722
	Equal variances not assumed			-1.042	164.278	.299	-.09795	.09402	-.28360	.08770

Appendix 10

Table 10: Independent Samples Test for rating to what extent employees have these skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1-Project Management	Equal variances assumed	.080	.778	-.621	237	.535	-.04831	.07775	-.20147	.10485
	Equal variances not assumed			-.645	181.956	.520	-.04831	.07495	-.19620	.09958
2-Interpersonal Skills	Equal variances assumed	4.199	.042	-1.472	237	.142	-.11815	.08026	-.27625	.03996
	Equal variances not assumed			-1.432	152.214	.154	-.11815	.08253	-.28120	.04491
3-enterpise skills	Equal variances assumed	4.413	.037	-8.517	237	.000	-.68401	.08031	-.84223	-.52580
	Equal variances not assumed			-8.963	189.231	.000	-.68401	.07631	-.83455	-.53348
4-Technical skills	Equal variances assumed	9.278	.003	11.023	237	.000	1.28305	.11639	1.05375	1.51235
	Equal variances not assumed			12.542	226.020	.000	1.28305	.10230	1.08146	1.48464
5-Business skills	Equal variances assumed	.206	.651	-6.592	237	.000	-.67415	.10226	-.87561	-.47269
	Equal variances not assumed			-6.941	189.461	.000	-.67415	.09713	-.86575	-.48255

6-Conceptual skill	Equal variances assumed	76.848	.000	-5.657	237	.000	-.45914	.08117	-.61905	-.29924
	Equal variances not assumed			-6.443	226.418	.000	-.45914	.07127	-.59957	-.31871

Appendix 11

Table 11: Independent Samples Test for the importance of knowledge for Iraqi construction employees

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1- knowledge process	Equal variances assumed	8.405	.004	-1.598	237	.111	-.11877	.07433	-.26519	.02766
	Equal variances not assumed			-1.680	188.899	.095	-.11877	.07068	-.25818	.02065
2- Site Management, administration	Equal variances assumed	3.742	.054	-.936	237	.350	-.05274	.05635	-.16375	.05827
	Equal variances not assumed			-.963	177.917	.337	-.05274	.05477	-.16083	.05534
3-Quantity surveying	Equal variances assumed	.017	.898	3.814	237	.000	.31148	.08166	.15061	.47235
	Equal variances not assumed			3.989	186.010	.000	.31148	.07809	.15742	.46554

4- Construction technology	Equal variances assumed	.758	.385	3.732	237	.000	.32981	.08839	.15569	.50393
	Equal variances not assumed			3.909	186.970	.000	.32981	.08437	.16338	.49624
5-technolgy design	Equal variances assumed	11.673	.001	3.927	237	.000	.33082	.08423	.16488	.49677
	Equal variances not assumed			4.036	177.366	.000	.33082	.08197	.16907	.49258
6-Production knowledge on-site and off-site	Equal variances assumed	.526	.469	-1.042	237	.298	-.09795	.09399	-.28312	.08722
	Equal variances not assumed			-1.042	164.278	.299	-.09795	.09402	-.28360	.08770

Appendix 12

Table 2: Independent Samples Test - to what extent do employees have knowledge?

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
1- Site Management administration	Equal variances assumed	6.305	.013	-3.546	233	.000	-.23737	.06693	-.36925	-.10550
	Equal variances not assumed			-3.504	157.364	.001	-.23737	.06774	-.37118	-.10357
2- knowledge process	Equal variances assumed	1.718	.191	-2.794	233	.006	-.25293	.09053	-.43129	-.07456
	Equal variances not assumed			-3.020	200.827	.003	-.25293	.08376	-.41808	-.08777
3-Production knowledge on-site and off-site	Equal variances assumed	.414	.521	-.144	233	.885	-.01291	.08942	-.18909	.16328
	Equal variances not assumed			-.142	154.230	.888	-.01291	.09116	-.19300	.16718
4- Construction technology	Equal variances assumed	18.300	.000	7.844	233	.000	.96585	.12314	.72325	1.20845
	Equal variances not assumed			8.840	219.810	.000	.96585	.10926	.75053	1.18117
5-Quantity surveying	Equal variances assumed	29.621	.000	-6.091	233	.000	-.61111	.10033	-.80878	-.41344
	Equal variances not assumed			-6.752	212.775	.000	-.61111	.09051	-.78953	-.43269
6-tecbnlogy design	Equal variances assumed	1.523	.218	-11.956	233	.000	-1.13131	.09462	-1.31773	-.94489
	Equal variances not assumed			-12.110	168.670	.000	-1.13131	.09342	-1.31573	-.94689

Appendix 13

Model table of training needs assessment of skills and knowledge improvement						
What is your position	**Depended Variables of construction site problems**	**SD**	**D**	**N**	**A**	**S A**
Site manager	1- Technical Problems	3	0	33	43	2
	2- Poor communication	0	0	0	21	61
	3- Management site problems	0	0	2	37	43
	4- Skilled and knowledge workers	0	4	40	31	7
Civil engineer	1- Technical Problems	0	0	3	25	34
	2- Poor communication	0	0	1	31	32
	3- Management site problems	0	0	15	37	12
	4- Skilled and knowledge workers	0	1	15	22	26
Project leader	1- Technical Problems	1	0	21	10	2
	2- Poor communication	0	0	1	15	17
	3- Management site problems	0	0	0	10	23
	4- Skilled and knowledge workers	0	2	18	10	2
Architect	1- Technical Problems	0	0	5	32	21
	2- Poor communication	0	0	4	33	23
	3- Management site problems	0	1	9	39	11
	4- Skilled and knowledge workers	0	0	4	18	38
What is your position	**Depended variables of TNA indictors**	**SD**	**D**	**N**	**A**	**S A**
Site manager	1- lack of knowledge and skills	0	2	33	34	13
	2- Career development	0	14	45	21	2
	3- Organizational problems	0	0	0.	22	60
	4- Changes in work environment	0	3	21	37	21
Civil engineer	1- lack of knowledge and skills	0	1	10	41	12
	2- career development	0	1	28	34	1
	3- Organizational problems	0	0	1	29	34

	4- Changes in work environment	0	17	36	10	1
Project leader	1- Installation of new equipment	0	0	11	16	6
	2- career development	0	0	1	11	21
	3- Organizational problems	0	0	3	10	20
	4- Changes in work environment	0	0	0	6	27
Architect	1- Installation of new equipment	0	1	5	23	31
	2- career development	0	1	38	19	2
	3- Organizational problems	0	0	8	30	22
	4- Changes in work environment	0	23	33	4	0
What is your position	**Depended Variables of TNA barriers**	**SD**	**D**	**N**	**A**	**S A**
Site manager	1-Lack of financial resources;	0	1	32	31	18
	2-Lack of adequate expertise	0	0	7	34	41
	3-Lack of job descriptions	0	1	2	20	59
	4-Unsystematic training approaches	0	3	13	32	34
	5-Lack of support from top management	0	0	8	32	42
	6-Lack of new workers interested in skills development programs	1	34	33	14	0
	7-Once trained, employees leave our organization	0	8	48	19	7
Civil engineer	1-Lack of financial resources;	0	0	13	20	31
	2-Lack of adequate expertise	0	1	5	33	25
	3-Lack of job descriptions	0	0	2	24	38
	4-Unsystematic training approaches	0	1	34	24	5
	5-Lack of support from top management	0	0	2	10	52
	6-Lack of new workers interested in skills development programs	0	22	33	9	0
	7-Once trained, employees leave our organization	0	10	33	20	1
Project leader	1-Lack of financial resources;	0	0	12	15	6
	2-Lack of adequate expertise	0	0	1	14	18

	3-Lack of job descriptions	0	1	3	13	16
	4-Unsystematic training approaches	0	2	16	12	3
	5-Lack of support from top management	0	0	5	19	9
	6-Lack of new workers interested in skills development programs	0	11	15	7	0
	7-Once trained, employees leave our organization	0	3	7	4	19
Architect	1-Lack of financial resources;	0	0	13	26	21
	2-Lack of adequate expertise	0	0	2	26	32
	3-Lack of job descriptions	0	1	4	23	32
	4-Unsystematic training approaches	0	6	24	22	8
	5-Lack of support from top management	0	0	0	17	43
	6-Lack of new workers interested in skills development programs	0	19	32	9	0
	7-Once trained, employees leave our organization	0	14	25	18	3
What is your position	**Depended Variables of TNA Methods**	**SD**	**D**	**N**	**A**	**SA**
Site manager	1-Performance Appraisal Forms	0	1	3	40	38
	2- On-site visit and Observations	0	2	21	49	10
	3-Questionnaires	0	8	28	38	8
	4-Focus Groups	0	5	55	22	0
	5-Delphi Method	0	21	52	9	0
	7-Assessment Centres	0	22	48	10	2
	8-Document Reviews / Examinations	0	37	37	8	0
	10- Advisory Committee	1	49	26	3	3
Civil engineer	1-On-site visit and Observations	0	0	13	26	25
	2-Performance Appraisal Forms	0	2	26	28	8
	3-Questionnaires	0	9	25	25	5
	4-Focus Groups	0	6	49	9	0

	5-Delphi Method	0	19	37	8	0
	7-Assessment Centres	3	17	41	3	0
	8-Document Reviews / Examinations	4	31	26	3	0
	10-Advisory Committee	7	46	11	0	0
Project leader	1-On-site visit and Observations	0	0	0	15	18
	2-Performance Appraisal Forms	0	0	7	17	9
	3-Questionnaires	0	5	8	14	6
	4-Focus Groups	0	10	14	9	0
	5-Delphi Method	0	0	8	19	9
	7-Assessment Centres	0	10	17	6	0
	8-Document Reviews / Examinations	0	13	14	6	0
	10-Advisory Committee	5	22	6	0	0
Architect	1- Performance Appraisal Forms	0	2	11	35	12
	2- On-site visit and Observations	0	1	24	29	6
	3-Questionnaires	1	3	7	29	20
	4-Focus Groups	3	1	35	17	4
	5-Delphi Method	2	8	36	14	0
	7-Assessment Centres	2	19	31	8	0
	8-Document Reviews / Examinations	4	25	24	7	0
	10-Advisory Committee	4	31	22	3	0
What is your position	**Depended Variables of TNA Methods**	**SD**	**D**	**N**	**A**	**SA**
Site manager	Availability and expertise of HR staff	**0**	**0**	**3**	**40**	**37**
	Cost-effectiveness	**0**	**0**	**40**	**35**	**5**
	Top management preference	**0**	**0**	**17**	**47**	**20**
	Time required	**0**	**5**	**45**	**15**	**10**
	Organizational culture and value	**5**	**15**	**40**	**12**	**8**

	Facilities available	**10**	**20**	**45**	**5**	**0**
Civil Eng.	Cost-effectiveness	**0**	**6**	**20**	**30**	**5**
	Top management preference	**0**	**0**	**6**	**48**	**10**
	Time required	**0**	**0**	**9**	**40**	**5**
	Organizational culture and value	**9**	**0**	**15**	**45**	**5**
	Facilities available	**0**	**0**	**0**	**49**	**12**
	Availability and expertise of HR staff	**0**	**4**	**10**	**42**	**8**
Project leader	Cost-effectiveness	**0**	**0**	**0**	**15**	**18**
	Top management preference	**0**	**0**	**0**	**12**	**21**
	Time required	**0**	**0**	**6**	**12**	**15**
	Organizational culture and value	**0**	**2**	**8**	**12**	**10**
	Facilities available	**0**	**5**	**10**	**8**	**10**
	Availability and expertise of HR staff	**0**	**15**	**30**	**20**	**5**
Architects	Cost-effectiveness	**0**	**5**	**35**	**25**	**5**
	Top management preference	**0**	**2**	**20**	**30**	**12**
	Time required	**0**	**0**	**13**	**47**	**24**
	Organizational culture and value	**0**	**4**	**20**	**30**	**10**
	Facilities available	**0**	**4**	**10**	**37**	**14**
	Availability and expertise of HR staff					
What is your position		**SD**	**D**	**N**	**A**	**SA**
Site manager	**PEST analysis**	0	10	40	30	0
	organizational scanning	19	47	14	0	0
	SWOT analysis	20	50	8	2	0
	balanced scorecard	32	40	7	1	0
Civil Eng.	**PEST analysis**	16	36	4	14	0
	organizational scanning	10	27	18	4	0
	SWOT analysis	31	25	15	0	0
	balanced scorecard	40	30	20	2	0

Project leader	**PEST analysis**	4	7	20	5	0
	organizational scanning	5	6	16	4	0
	SWOT analysis	10	8	12	2	0
	balanced scorecard	12	20	10	0	0
Architect	**PEST analysis**	20	22	14	8	0
	organizational scanning	14	25	20	5	0
	SWOT analysis	10	20	12	2	0
	balanced scorecard	20	30	14	0	0
What is your position	**Depended Variables of important of TNA**	**SD**	**D**	**N**	**A**	**SA**
Site manager	1- training effectiveness	0	0	0	23	59
	2- Organizational Goal	0	0	3	52	27
	3-Training cost	0	0	6	43	33
	4- Managing Change	0	17	44	21	0
	5- Professional Development	0	1	36	38	9
	6- Career Development	0	0	6	31	45
	7- Motivation to Learn	0	8	54	20	0
	8- Knowledge, Skills and Attitude	0	1	37	43	1
Civil engineer	1- training effectiveness	0	0	0	34	30
	2- Organizational Goal	0	0	3	55	6
	3 -Training cost	0	0	2	44	18
	4- Managing Change	0	9	36	16	3
	5- Professional Development	0	4	34	25	1
	6- Career Development	0	5	39	19	1
	7- Motivation to Learn	0	0	7	19	38
	8- Knowledge, Skills and Attitude	0	0	4	13	47
Project leader	1- training effectiveness	0	0	0	25	8
	2- Organizational Goal	0	0	0	9	24
	3- Training cost	0	0	4	10	19

	4- Managing Change	0	1	16	15	1
	5- Professional Development	0	0	8	13	12
	6- Career Development	0	0	3	4	26
	7- Motivation to Learn	0	1	18	12	2
	8- Knowledge, Skills and Attitude	0	2	14	15	2
	Project-based programme	0	10	16	7	0
	Advisory Committee	5	22	6	0	0
Architect	1- training effectiveness	0	2	11	45	14
	2- Organizational Goal	0	0	6	42	12
	3- Training cost	0	0	7	32	21
	4- Managing Change	0	35	31	24	1
	5- Professional Development	0	6	38	14	2
	6- Career Development	0	9	39	9	3
	7- Motivation to Learn	0	0	9	19	32
	8-Knowledge, Skills	0	0	0	13	47

Appendix 14

Cover Letter

Dear participant

I am currently studying a PhD degree at the University of Salford, United Kingdom. I am undertaking a research Needs Assessment of construction workforce skills and knowledge need in Iraq construction industry . Through this research, the researcher is trying to become acquainted with the issue of discovering the skills and knowledge deficiencies existing among Iraqi construction and to examine the specific training needs of construction employees handling selected construction projects. By drawing on your experiences in skills needs in your organization, I plan to develop a framework that can be used to assess the most desirable skills, which your organization need in its construction project activities. It is hoped that this study will provide information that will help other organizations to have the interest in undertaken training, developing employee's skills and to address the persistent problem of skills shortage. The researcher is to embark on this research project for the following purposes:

1- To conduct literature reviews on the theories, framework, model school of thought, of training needs assessment and its importance to construction organization.

2- To review of needs assessment drivers and challenges in construction industry

3- To address workforce and knowledge's, skill-related problems in construction by reviews Training Needs Assessment which is considered the key issue in contributing to the success of the training programmes

4- To identify the most important desirable skill needs of an effective construction workforce for successful construction management as perceived by the significant actors in the construction project.

5- To evaluate the degree of agreements/disagreements between any groups of practitioners regarding the rankings of important TNA outcome.

I would like to assure you that your response would be processed as `Strictly Confidential'. All data will be password protected and will be kept in a secure place by the researcher. This data will be destroyed within 1 year of receipt for electronic responses. Your response will be used for academic research and development purposes. So please try to answer all questions included, however, participation in the questionnaire is voluntary and you may choose to withdraw at any time without needing to give any reason. Your individual answers will be treated in confidence and the responses from all the completed questionnaires will be aggregated for use in the research report. If you would like to receive a summary of the research findings, please provide your contact details at the end of the questionnaire and these will be shared after the data has been aggregated and analysed. Should you wish to withdraw at any stage, your responses will be destroyed immediately. Time estimation to process this survey is about 10 to 15 mints. Please complete the questionnaire by 20 of Jan 2012.

Appendix 15

Thesis Survey

1. **Do you wish to proceed?**
   Yes

   No

What is your age group?

- 25-30
- 31-40
- 41-50
- 51-60
- 61-70

3. How many years have been working in this company

- 0-2Yrs
- 3-5Yrs
- 6-10Yrs
- 11-20 Yrs.

4. What is your position in your company

- Site manager
- Civil engineer
- Project leader engineering
- Architect

5. what is your company size

	Large company	Medium company	Small company
Company size	○	○	○

How often your company conducting TNA

	1- Never	2- every one year	3- every 2 years	4- every 3 years	5- ad – hoc
	○	○	○	○	○

7. To what extent do you disagree and agree for the following most possible construction site management problem

	1-Strongly disagree	2-Disagree	3-Nuetral	4-Agree	5-Strongly agree
Technical problems	○	○	○	○	○
Poor communication	○	○	○	○	○
Management problems	○	○	○	○	○
Shortage of skilled and knowledge workers					

8. To what extent do you agree or disagree with the following possible indicators to assess the training needs?

	1-Strongly disagree	2-Disagree	3-Nuetral	4-Agree	Strongly agree
1- development employees skills	○	○	○	○	○
2- to meet new changes in work environment	○	○	○	○	○
3-Organizational problems	○	○	○	○	○
4-Career development	○	○	○	○	○

9. What is the common barriers for conducting training needs in your company ?

	1.Strongly disagree	2-Disagree	3.Nuetral	4.Agree	5.Strongly agree
1-Lack of funding resources;	○	○	○	○	○
2-Lack of adequate expertise	○	○	○	○	○
3-lack job descriptions	○	○	○	○	○
4 Unsystematic training approaches	○	○	○	○	○
5-Lack of support from top management	○	○	○	○	○

	1.Strongly disagree	2-Disagree	3.Nuetral	4.Agree	5.Strongly agree
6-Lack of new workers interested in skills development programs;	○	○	○	○	○
7-wasting of time and money	○	○	○	○	○

10. To what extent do you agree or disagree with the following possible best Methods Used in determining TNA in your company

	1-Strongly disagree	2-Disagree	3-Nuetral	4-Agree	5-Strongly agree
1- Delphi Method	○	○	○	○	○
2-On-site Observations	○	○	○	○	○
3-Questionnaires	○	○	○	○	○
4-Advisory Committee	○	○	○	○	○
5-Document Reviews / Examinations	○	○	○	○	○
6-Focus Groups	○	○	○	○	○
7-Performance Appraisal Forms	○	○	○	○	○
8- Assessment Centres	○	○	○	○	○

Q11 : To what extent do you agree or disagree with the following possible best criteria for determining TNA in your company

	1-Strongly disagree	2-Disagree	3-Nuetral	4-Agree	5-Strongly agree
1- availabilities of HR expertise	○	○	○	○	○
2- Top management preference	○	○	○	○	○
3-Time required	○	○	○	○	○

	1-Strongly disagree	2-Disagree	3-Nuetral	4-Agree	5-Strongly agree
4-Cost effectiveness					
5-availiablties of facilities					

Q12. How often does your company use these techniques in conducting TNA?

12. A)

Training needs assessment based on organizational level

	1. Never	2.Rare	3.Seldom	4.Frequent	5.always
1- SWOT analysis (Organizational Level)					
2-organizational scanning (Organizational Level)					
3-balanced scorecard (Organizational Level)					
4-PEST analysis (Organizational Level)					

12. B

Training needs assessment in your company based on operational level

	1. Never	2.Rare	3.Seldom	4.Frequent	5.Always
1-Job Analysis (Operational Level)					
2- competency analysis (Operational Level)					
3-managerial skills audit (Operational Level)					
4-skills inventory (Operational Level)					

12 C : Training need assessment in your company based on Individual Level

	1-Never	2-Rare	3-Seldom	4-Frequent	5-Always
1-performance review / appraisal (Individual Level)	○	○	○	○	○
2-Repertory Grid Analysis (Individual Level)	○	○	○	○	○
3-versatility chart / analysis (Individual Level)	○	○	○	○	○
4- diary Analysis (Individual Level)	○	○	○	○	○

Q13 . Importance of training needs in your company

	1-Strongly disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly agree
Training needs assessment play important role to ensure training effectiveness improvement	○	○	○	○	○
Training help to achieve organizational 's goals if it is based on training needs assessment of construction employees	○	○	○	○	○
TNA helps to achieve training cost reduction effectiveness	○	○	○	○	○
Training needs assessment help to manage change in your company	○	○	○	○	○
TAN aim to improve workforces	○	○	○	○	○

	1-Strongly disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly agree
development professional and personal development respectively					
Result of training needs assessment are used as gaudiness for career development	◯	◯	◯	◯	◯
Training needs assessment help to motivates constructions employees to learn in construction field	◯	◯	◯	◯	◯
TNA used for improving the trainees level of knowledge, skills, and attitude	◯	◯	◯	◯	◯

Q 14: Can you rate the importance of these skills in your company (level of importance)

	1-Not important	2-Somewhat important	3-Neutral	4-Important	5- Very important
1-Technical Skills	◯	◯	◯	◯	◯
2-Project Management Skills	◯	◯	◯	◯	◯
3-Conceptual skill	◯	◯	◯	◯	◯
4- Enterprise skills	◯	◯	◯	◯	◯
5-Business Skills	◯	◯	◯	◯	◯
6-Interpersonal Skills	◯	◯	◯	◯	◯

Q 15 :Can you rate to what extend you possessed these skills?

	1- Poor	2-Fair	3- Average	4- Good	5-Excelent
1-Project Management	○	○	○	○	○
2-Interpersonal Skills	○	○	○	○	○
3-Enterpsie skills	○	○	○	○	○
4-Technical skills	○	○	○	○	○
5-Business skills	○	○	○	○	○
6-Conceptual skill	○	○	○	○	○

Q 16: Can you rate the important of this knowledge in your company?

	1- Not important	2- Somewhat important	3- Neutral	4-Important	5-Very important
1- Management, of administration sites	○	○	○	○	○
2- knowledge process	○	○	○	○	○
3-knowlage production on site	○	○	○	○	○
4- Construction technology	○	○	○	○	○
5-Quantity surveying	○	○	○	○	○
6-desgine technology	○	○	○	○	○

Q17: To what extend do you possessed these knowledge's in your company ?

	1- Poor	2-Fair	3- Average	4- Good	5-Excelent
1- Management, of administration sites	○	○	○	○	○
2- construction knowledge process	○	○	○	○	○
3- Knowledge production on site	○	○	○	○	○
4- Construction technology	○	○	○	○	○
5-Quantity surveying	○	○	○	○	○
6-desgine technology	○	○	○	○	○