An Analysis of the Quality Management Practices Used in the Construction Industry and Their Effectiveness: Case Study on Irish Construction Companies

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DECLARATION

This research purposed to investigate the current quality management practices in the Irish construction industry I declare that this dissertation that I have submitted to Dublin Business School for the award of MBA (Project Management) is the result of my investigations, except where otherwise stated, where it is clearly acknowledged by references. Furthermore, this work has not been submitted for any other degree.

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ABSTRACT

Project quality management is one of the biggest factors influencing the construction industry globally. This research is an attempt to investigate the current quality management practices in the Irish construction industry, to identify the most productive of them, the challenges being faced by Irish construction companies in implementing the quality management practices and to provide a conclusive recommendation on how these companies can improve their productivity through quality management practices. A qualitative research approach was used. Interviews were initially to be the primary method of data gathering but due to the imminent challenges, case study approach was used. This research revealed that the fragmentation of the Irish construction industry was the biggest challenge to quality management practices. The research also revealed that the Irish construction companies perceived quality as being able to complete projects within budget and schedule. In conclusion, this research recommended project-specific training and the accordance of project teams as independent organizations.
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CHAPTER ONE

INTRODUCTION

1.1 Background

Gitlow, et al., defined quality as an emerging concept due to its ever-changing definition (2005, p. 17). The definition of quality has shifted from mere conformance to customer expectations to a phenomenon where a product or service can be rendered at low cost while maintaining its dependability and uniformity (Gitlow, et al., 2005, pp. 17-18).

The construction industry is one industry that has an unforgiving nature towards poor quality, as lack of quality could be detrimental to both the contractors and the clients. In this industry, quality is determined by the client by a series of documents before the commencement of a project. The details of these documents depict the client’s requirements for the project at hand, and the contractor must fulfil those requirements to achieve quality in that project (Rajendran, et al., 2012). The following objectives help to confirm the quality of a construction project; Satisfaction of contract specifications; Timeliness in project completion; Customer’s satisfaction with the project; Purpose-based performance; Motivation and empowerment of employees and; Avoiding disputes and claims.

Quality management is, therefore, a major focus for construction project managers as the whole project must be undertaken towards meeting the customer’s requirements. Hoyle classified quality management into four major aspects; quality planning, quality control, quality improvement and quality assurance (2007, pp. 21-22). These four pillars of quality management form the basis on which quality can be managed throughout the duration of a construction project.
In the past decades, the construction industry has been characterized with issues of productivity and poor performance, as clients are demanding projects to be completed on schedule and within budget (Hoonakker, et al., 2010). The industry, citing the manufacturing sector as an inspiration, is starting to adopt successful quality management concepts such as total quality management (TQM), and lean philosophy (Just-in-Time production). Hoonakker et al. defined quality in the construction industry as the capability to meet customer expectations, capability for projects to stay within budget and within schedule, reduced defects and reworks, and projects’ conformance to the ISO 9000 standards of quality. However, barriers were cited that could hinder certain quality management in the construction industry. Total quality management, for example, will be difficult to implement in such an industry where there is a huge amount of personnel involved in project execution (Hoonakker, et al., 2010).

The construction industry is one of the most fundamental industries in the development of a country, and happens to be one that consumes an exorbitant amount of time and resources. Hubert Fitzpatrick, the Director of Housing and Planning in Ireland told the Construction Industry Federation (CIF) that the drastic reduction in the construction of homes in Dublin is due to most of those constructions not being financially viable (Irish Times, 2018). In the first half of 2018, only 28% of planned homes were completed, the Department of Housing reported. This signifies an urgent lack of quality management implementation among the construction firms. Hence, there is a need for proper quality management structures in the construction companies to effectively manage the available resources while attaining premium quality in their services.

Serpell, et al., (2002) conducted a research on the Chilean construction industry to analyze the perceptions of various quality personnel in the industry, as well as establish a diagnosis of the current level of quality in the industry. With the aid of semi-structured interviews and
questionnaire surveys, they were able to gather information from contractors and clients. From the interviews, they identified certain barriers that exist in the industry. They argued that some construction professionals tend to have too many responsibilities to handle during projects and hence tend to pay little attention to quality control. This issue can, however, be tackled by hiring a specialist quality manager to handle quality issues before, during, and after the phase of a project. A hindrance to quality can also result from clients’ inability to properly define their expectations from a construction project. Clients need to outline their expectations for a project to be undertaken and must assume responsibility in effectively communicating those expectations to the contractor, and in the process take charge of the eventual costs the quality required may accrue (Serpell, et al., 2002).

Most Irish construction firms already have quality management practices in place. However, attaining acceptable levels of quality in rendering efficient project performance remains a problem. There is currently no research about the quality management practices done in Ireland; hence, this research proposes to address this gap in knowledge and proposes to identify the most effective quality management practices that can be used in the construction sector in Ireland.

This research will add to the existing knowledge of the most effective quality management practices that can be used in the construction industry, with Ireland being the focal point of the research.

As with every research, it is imperative to have background knowledge of the existing researches done in the study to have an idea of what previous researchers know about the topic. It is important to note that this research about to be conducted has never been done in this country. Hence this shortage of research means that some of the pieces of literature that will be provided
In this research are involved with quality management practices in other countries. However, assumptions and parallels can be drawn between the literatures.

In the history of Ireland, no research has been done to evaluate the existing quality management practices in the construction industry. This information is very vital however, to give new and upcoming construction companies knowledge of the best practices to use to attain optimum project performance and customer satisfaction. By identifying the challenges the construction firms might face in implementing the most efficient quality management practices, it gives new construction firms a platform to build on (Lynch & Tucker, 2013, p. 183). Hence, the importance of this research cannot be overstated.

The provisions at the end of this research will have been obtained from the findings and analysis of other similar case studies around the world in the construction industry. Accredited sources by experts in the field of construction will be consulted thereof, to develop quality improvement strategies as in the matter of construction in Ireland, which can also be applied elsewhere.

This chapter includes the research aim and objectives, the research questions, the context of the research, the rationale of the research, and the scope that will be used in the research.

1.2. Aim and Objectives

**Aim**

Analyzing the existing quality management practices in Irish construction firms will give us an overview of the aspects that can be improved on in terms of delivering a project at the proposed timeframe and the right quality. Thus, this research is aimed at identifying the quality-related issues that exist in the Irish construction industry, and the quality management practices that are commonly adopted for tackling these issues. Then the research will evaluate the current situation
of the industry to identify potential quality management initiatives that can be implemented by these companies to enhance their quality.

**Research Objectives**

- To evaluate the significance and importance of quality management in the construction industry
- To identify and analyze the effectiveness of the quality management practices currently used in the Irish construction industry.
- To identify potential quality management practices that will help improve the quality in the construction industry in Ireland and globally as well.

At the end of this research, the construction firms in Ireland will have a solid knowledge of their existing quality management practices and realize why they are not attaining optimum quality in their services. The proposed quality management initiatives will also enable them to decide how they can improve on their services and an idea of the most suitable practices they can employ.

**Research Questions**

The main research question:

What is the current situation of quality in the Irish construction industry and how can quality be improved significantly in the industry?

The research sub-questions:

1. What are the major challenges encountered in the construction industry in Ireland and what is the impact of quality on the industry practices?
2. Which quality management practices are being employed in Ireland construction companies and how effective are they?

3. What is the significance of quality management practices in the successful completion of construction projects?

4. Which quality management practices are best recommended to improve productivity in the construction industry?

5. How can the recommended quality management practices to improve project performance be easily integrated into Irish construction companies?

The research questions highlighted above reflects the direction which the research is going to take. By getting answers to these questions, the research will have gathered substantial information which will go a long way in fulfilling the research objectives. Hence, this research is undertaken for examining the current and existing quality management practices in the Irish construction industry, and for identifying the barriers and limitations of the practices. In the process of this, the research will be able to propose suitable quality management practices that are best suited to the industry and will result in efficient and effective project performance.

1.3. Research Context

The construction industry suffered a massive decline during the recession in recent years as construction and finance transactions diminished drastically (The Law Review, 2017). Public-Private Partnership (PPP) projects that were funded through banks and other financial institutions came to a hold, including massive projects such as the Thornton Hall prison and the large scale mass-transport projects, the Metro North and DART underground. It is also worthy to note that
the Law review attributed the further decline of the industry in that period to the inadequate planning and lack of knowledge. This is where the knowledge of quality management comes in. To address the various issues influencing the industry, it is imperative to implement quality measures to find the means of improving productivity.

Housing delivery is a major source of concern for the construction industry in Ireland; the ongoing crisis has placed a huge burden on construction companies to prioritize maintaining projects’ delivery timeframe (Engineers Journal, 2018). The Chief Economist at Davy, Ireland’s leading Stockbroking Company reported that consumer spending in the construction sector grew by 3.2% in 2018 and 3.0% in 2019, employment rose by 2.7% and 2.5% respectively (Engineers Journal, 2018). Homebuilding was also reported to grow by 23% in 2018 and 20% in 2019. These statistics represent a huge transformation going on in the sector, and urgent attention needs to be placed on ensuring quality is at the forefront of the development of the sector.

The challenges the construction firms are facing now are due to the lack/improper implementation of effective and efficient quality management practices to ensure successful project performance (Lynch & Tucker, 2013, p. 183).
CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction
This section contains descriptions, summaries, and evaluations of sources in the context of their contribution to the topic under research. The relationship of each work to others is also explored to arrive at more informed findings, to identify gaps in those works and arrive at new interpretations of these prior research works.

2.2.1. Quality Management
Quality expert, Kaoru Ishikawa stated that “In management, the first concern of the company is the happiness of the people who are connected with it. If the people do not feel happy and cannot be made happy, that company does not deserve to exist…” (Gitlow, et al., 2005, p. 20). This statement is a unique take on the concept of quality as it emphasizes on the stakeholders in the organization. The people who are connected with the organization are the stakeholders, and they include the employees, customers, contractors, suppliers, and the community (Gitlow, et al., 2005, pp. 20-21). The stakeholders mentioned in the statement above are the employees as they are considered to be the most critical to how quality can be attained in an organization. Thus, to effectively manage and pursue optimum quality in an organization, the most critical stakeholders in that organization (the employees) need to be kept happy as they are essential to the progress of that organization.
According to Dale, et al., (2007, p. 23), quality has evolved in the last two decades from basic inspection activities to major controlled processes. Quality control and quality assurance are part
of the revolutionalised modern quality management practices. Hoyle, (2007, p.21) explained what he termed ‘the four pillars’ of quality management; quality planning, quality control, quality improvement, and quality assurance.

Project quality management is a unique entity that cannot be overlooked in the execution of a project, it has to do with managing projects of all sorts and how to achieve the deliverables attributed to them (PMBOK Guide, 2017). It is the process of planning, managing, and controlling quality in a project. This simply implies that project quality management is imperative to execute any construction project. To successfully implement efficient quality management practices, there is a need to identify the existing level of quality in the organization, this is paramount before any plan can be devised and implemented. Burke, (2013, p. 316) emphasized the importance of quality management in achieving project objectives; he stated that companies must tailor their quality management systems to meet the project deliverables on schedule.

There are several ways of managing quality in construction projects. Some quality management practices have been in vogue for hundreds of years; however, there is a need to address the current predicament of the industry by employing certain practices. Kerzner, (2017) explained how the need to improve quality is driven by customers’ demands, the need to deliver projects on schedule, lower rates of defects in projects, and lower contractor profit margins are some of the basic customer demands. He explained the evolution of quality over the past number of years from being the responsibility of certain employees in an organization to being everyone’s responsibility. In the modern day, organizations are starting to make quality the responsibility of every employee to ensure quality is embedded into their organizational culture.
The customer-focused orientation of quality is typified by a quality management practice called total quality management (TQM). Ishanka and Gooneratne (2018) defined TQM as the implementation of certain measures in a project to cut out costs that are not adding value to the project, and in the process increasing productivity. Catalin, et al., (2014) also defined TQM as a phenomenon whereby organizations seek continuous improvement by altering their organizational structure to suit customers’ expectations. This approach towards quality management has been in place for decades, several organizations have tried to implement it due to its long-term effects on quality improvement. However, as is the case with any new quality management approach, certain barriers might be encountered in implementing TQM.

‘Six Sigma’ is also one quality management practice that is gradually gaining ground as a result of its influence on construction project performance. Stewart & Spencer (2006) described the outcome of six-sigma implementation in a process improvement project in London. The project entailed the construction of longitudinal beams in a railway station in London. The outcome of this initiative recorded an improvement in productivity of beam production, reduced project delays, and better interaction between project teams. Six-sigma provided the process improvement team with a structured process improvement strategy to cut out non-value-adding activities from the construction process.

Gitlow, et al., (2005, p. 26) highlighted Edward Deming’s approach to quality improvement. In a bid to improve productivity, organizations can focus on improving quality to attain certain benefits. By doing so, there will be many cases of rework; quality will be improved, which will lead to an upturn in productivity. Also, the employees in the organization will be kept happy as the process will be well defined and less stressful. Hence, quality improvement brings about several advantages.
2.2.2. The Construction Industry

Construction has been in existence since the inception of mankind as humans have had to provide shelter for themselves in every stage of mankind. After the 2nd World War, the United States took a significant development in the construction industry. They began to mass-produce steel. Steel is a hugely important building material that is used in virtually every construction projects, major or minor. The mass production of steel by America changed the face of the construction industry (Constructible, 2019).

Fast forward to the present day, the construction industry is enjoying a new level of productivity. Bridges, skyscrapers, roads, are all dependent on steel to be constructed. The construction industry can be categorized into three sectors; buildings, infrastructure, and Industrial. Building construction can further be divided into two sub-categories which are residential and non-residential buildings also known as commercial or institutional. The construction industry offers various job opportunities in various capacities all over the world. This industry was estimated to be worth $17140 billion in 2017 (Business Wire, 2018). There are more than 680,000 employers in this industry and more than 7 million employees. To say the least, the construction industry plays a crucial role in the global economy.

2.2.3. Quality in the Construction Industry

The concept of quality in the construction industry has been placed under focus for thousands of years. It is only recently that these quality concepts and processed are now gaining widespread recognition (Construction Quality Council, 2015).

Different countries have implemented different approaches to quality at one time or the other in their history. Back in the early stages in China, construction workers used to rely on a set of standards to guide their activities. These standards are followed by inspection activities and
training to the personnel in the industry to ensure high-quality services in their industry (Construction Quality Council, 2015).

In ancient Rome, quality in construction has evolved significantly over hundreds of years. There was a period where power was highly centralized in Rome, this era witnessed builders requiring extensive standardization from the ruling class to undertake projects. Then, a hierarchical structure was adopted in the Greek construction industry where quality became the responsibility of every individual. Subordinates were to report any quality issues directly to the supervisor in charge. In 500 AD, brick stamps and contracts were adopted in the manufacturing of bricks for use in construction to trace any mishap in quality of the bricks back to the manufacturer.

2.2.3. Significance and Importance of Quality Management in the Construction Industry

The term quality management can be described as continuous efforts to achieve the required quality levels. These quality levels can be ones prescribed by the customers and also those standards that have been set by regulatory bodies to ensure a certain assurance of quality from all construction firms (Jackson & Bohrer, 2010, p. 81). Quality management is also important because it also ensures that the construction companies remain competitive in the market and that they survive in the long term. Harris and McCaffer (2001) explain that good quality management in the construction industry also leads to the creation of an excellent working environment where the established policies and procedures lead to the operational success of the company. They nonetheless, also note that the role of quality management cannot be reduced to a single activity but rather it is associative of both managerial and operational processes in the construction companies. Biggar explained how quality management requires the various levels of an industry
to be integrated so as to improve the performance of the company and subsequently enhance customer satisfaction (1990, pp. 2-4).

There are several pieces of literature which promote quality management in the construction industry. Some of these literature advocates for construction companies to adopt the ISO certification which has the following as its major clauses; quality management system, management responsibility, resource management, product realization, and measurement, analysis, and improvement. According to many researchers, the ISO 9000 standards have provided and continue to provide a good foundation on which competent and beneficial quality management systems can be built in the construction industry. Quality management practices are not only essential because they are a requirement in the ISO 9000 standards but also because quality is simply an outcome. An outcome can be good or bad and each result has its repercussions. The importance of quality management in the construction industry can thus be asserted by looking at what comes from the lack of it – poor outcomes.

In health and safety, the lack of quality is an automatic guarantee of poor health and safety (Zin & Ismail, 2012, p. 743). Safety accidents are often a result of poor quality in preventing such from happening. Poor quality management often means that construction projects have to be reworked and this subsequently means that the workers are going to be re-exposed to the risks related to the construction of the project. A much common example is that poor quality management will lead to the construction of buildings that are not up to standards and therefore not fit for people to live in. Globally, poorly constructed buildings have collapsed and have led to the loss of lives and serious injuries. Quality in construction is therefore literally a matter of life and death and adequate quality management practices need to be put in place so as to ensure that
the lives of people are not at risk because of the negligence of the construction companies either at the managerial positions or the operational positions (Zin & Ismail, 2012, p. 743).

Poor quality management is also a big threat to the environment (Ireland, 2004, p. 372). Poor quality often leads to the replacing of materials which simply depicts wastefulness. The wastefulness of resources harms the environment because these replacements often require new raw materials to be manufactured and delivered to sites which influences the carbon footprint (Marinelli, et al., 2014, p. 204). Other resources such as time are also wasted. For construction companies, resolving non-conformities can be time-consuming. It may also lead to losses in cases whereby additional human resource has to be brought into an already completed project to help resolve the defects. Poor quality can also negatively affect those working in construction if their efforts are torn down simply because the design had not been subjected to the quality standards. Poor quality management also greatly impacts the profitability of a construction company as well as the financial wellness of the customers. Quality management is an aspect that requires integration in all levels of construction. Quality management does not only ensure that the client’s requirements are met but also that the produced project is financially viable and functional. The construction industry is constantly changing due to new technological inputs. Quality management needs to be integrated with these changes and improvements so that projects are not behind the market.

2.3.0. The Construction Industry in Ireland

Just like in any other part of the world, the construction industry is a vital one in Ireland. The industry has, however, undergone very dramatic changes over the years due to factors such as the financial crisis which took place between 2008 and 2011 leading to a nationwide recession (Taggart, et al., 2012, p. 18). Many other industries in the economy recovered well thereafter but
the construction industry failed to do so. As a result, there have been some negative vices being experienced over the years in the Irish construction industry. The construction industry collapsed completely during this period and up to date, sites of unfinished developments can be sighted everywhere and they have evolved to become the emblems of Ireland’s economic failure (Marinelli, et al., 2014, p. 204). Statistics nonetheless show that the industry has been slowly growing over the years after the financial crisis. Whereas the number of homes being built per year in Ireland has been increasing, housing shortage remains to be a chronic problem (Taggart, et al., 2012, p. 19). Several surveys report a lack of high-quality housing and associated infrastructure such as roads, schools, and health facilities in Ireland and this has acted to threaten other benefits such as foreign investments into the country. The government has acknowledged and recognized this problem in the construction industry and has acted by promising massive infrastructure upgrades in its 2018-2027 National Development Plan (Vilken, et al., 2018, p. 302). The construction industry in Ireland has been unable to meet the demand for housing especially with overseas companies such as Google and Facebook setting up sites in Dublin which is now established as an attractive outpost of Silicon Valley within Europe.

2.3.1. Current trends in Ireland’s construction industry

A new boom has been reported in Ireland’s construction industry citing the shortages in commercial and residential properties as well as the necessary infrastructure that accompanies the same. A growth of 8% was experienced in the industry between 2017 and 2018 and Aecom Ireland estimates the growth to have gone beyond 14% in 2018 alone (Babu, 2019, p. 39).

Alternative sectors such as the Private Rented Sector (PRS) and Purpose-Built Student Accommodation (PBSA) have also been gaining traction slowly over the years. They are being seen to have less volatile income characteristics for capital growth as opposed to the traditional
property investment setups in the country. The number of people living in private rented accommodation properties continues to increase with 18.9% of people already living in such in 2018 (Babu, 2019, p. 39). In Dublin, the number is even higher standing at 24.5% of the total population there (Babu, 2019, p. 39). The property prices in Ireland are going higher faster than the incomes and this means growth for the rental sector. This is subsequently influencing the “build-to-rent” concept in Ireland. The concept is being offered as a solution to challenges of affordability and the changing demographic needs in the country (Lynch & Tucker, 2013, p. 183).

2.3.2. Challenges in Ireland's construction Industry

In Ireland, there is a broken housing system which has consequently led to a homelessness crisis (Lynch & Tucker, 2013, p. 183). More people are now renting in Ireland compared to ten years ago. Statistics show that currently, 1 in 5 people live in a privately rented house compared to 1 in 10 people ten years ago. There is, therefore, a lot of pressure on the private rental market. The supply for houses both rental and owned is way less than the demand. To the construction industry, this means that more houses need to be constructed within a short period. The construction industry understands that there is a housing crisis and therefore has interpreted this to mean that failure of projects ending in intended timeframes means more homelessness.

The construction industry on its own is also facing several challenges. First, the small scale builders are moving to other entities which are more financially attractive because there seems to be a lot of prohibitive costs (Hughes, 2018, p. 154). Despite the increase in demand for housing, the smaller construction companies are getting dissolved. This then has the effect of reducing the available human resource to work on the number of housing projects which are increasing every year. This is also bringing the effect of reducing employment opportunities for graduates in the
construction industry. This is even making it worse since the construction industry has been crippled and a majority of firms have been employing less than 10 people (Norris & Shiels, 2007, p. 45).

In the Irish learning system, apprenticeship periods before one becomes a fully incorporated builder such as an engineer can take up to four years. There is, however, a motion proposing to cut down this timeframe to one or two years so that the construction workforce increases faster and can efficiently deal the homelessness crisis (McGuinness & Bennett, 2006, p. 268). Such news has also led to careers in the construction industry being perceived as unattractive among the students and the youth. The Irish construction industry has never fully recovered from the economic crash and perhaps this is one of the reasons why the Industry is being perceived as unattractive (Taggart, et al., 2012, p. 19). There are, however, efforts to tackle this issue head-on. For example, initiatives such as the Construction Workers Pension Scheme are being put in place to reassure those interested in the construction of a financially secure future (Taggart, et al., 2012, p. 24).

The Irish construction industry is also facing a challenge in lack of local authority land available for construction (Lynch & Tucker, 2013, p. 183). There seems to be a lot of red tapes which cause delays in acquiring lands in Ireland. Such delays add on to the timeframe of project targets to counter the growing housing needs. Another problem that the Irish construction companies seem to be facing is the introduction of carbon taxes (McAuley, et al., 2012, p. 55). It should be noted that most of Ireland’s construction companies have not adopted Ireland’s carbon footprint. The government is prompting the same by rewarding those companies that already have with a 10% weighting in any public procurement process (Gunnigan & Eaton, 2006, p. 34). In other news, the planning process has been found to be the main delay for the critical housing and
infrastructure projects in Ireland whereas the turnover for top construction companies in Ireland have been recorded to hit their highest at more than 8.4 billion euros (Hughes, 2018, p. 156).

2.4.1. Construction Industry Practices in Ireland

Industry practices can be defined as the standards, practices, methods, and procedures in the various activities undertaken by a professional concerning matters of that industry. Industry practices can be differentiated as either good or bad depending on the quality of the results of these practices. Flood (1993, p. 34) defined quality as meeting the customers’ agreed requirements, formal and informal, at the lowest cost, every time. Quality is determined by everyone that is involved in the industry practices, at all levels, and across all functions.

Many researchers agree that the construction organizations in Ireland are more inward-looking and are managed more by control than by participation (Sharma & Gadenne, 2002, p. 394). It is difficult for organizations with these models to resonate with the needs of the customer because the workers of the company who interact with the customers are not given a voice by the management. The inward-looking attitude by management makes construction companies and other industry companies wary of training the typical transient construction workforce in the principles of TQM, as they fear that the fruits of their training efforts will be borne by other organizations; this reflects the situation in Ireland.

Innovation is critical in the construction Industry. To begin with, it helps the industry to position itself for recovery and a sustainable future growth both domestically and internationally (Peace, et al., 2010, p. 13). Through innovation, firms can differentiate their products and services offerings; develop new ways to reach customers and markets, and to improve business and operational processes and organizational structures (Peace, et al., 2010, p. 13). Innovation is
therefore crucial for all firms; those trading in local or international markets, whether large or small, and regardless of the sector in which they operate. The market is a constantly changing place and at the same rate, competition also increases. To be able to tackle the increasing competition, innovation and process improvement are a must since they help to bring in the competitive advantage (Peace, et al., 2010, p. 15). The construction industry has been established to one of the biggest energy consumers – a whopping 40% of the total energy consumption in the world (Horan, et al., 2019, p. 558). The importance of innovation in the construction industry, therefore, cannot be overstated. Below are some current key areas of innovation in the construction industry which are having massive impacts globally.

In Ireland, the adoption of new technologies, modern methods of construction and delivery processes are proving to be crucial in the establishment of more sustainable and competitive construction industry. One of these modern methods of construction includes offsite construction or factory-based construction. This can also be referred to as prefabrication and modularization. This is a construction method that encompasses the offsite manufacture of building elements (Marinelli, et al., 2014, p. 204). Although this construction method is not a new one, how it is perceived differs with many countries. Ireland has therefore taken up this practice not only because of its good aspects but also because the difficult economic conditions in Ireland are making the lean methods and practices to become more appealing. The Green agenda is also influencing the move to the offsite construction in Ireland (Marinelli, et al., 2014, p. 204). Offsite construction has little weather interruption and also provides a predictable and flexible solution (Horan, et al., 2019, p. 558). It is also supported by the technological advancements in the country, the developments in the quality of materials, the rising use of Building Information
Modelling (BIM) and sophisticated manufacturing facilities. The construction industry in Ireland is thus experiencing productivity gains on projects which were not possible before.

Years ago, the construction sector was identified to be taking up a total of 14% of the total hours worked in the economy, having gone up from 11% in the years 2000 (McGuinness & Bennett, 2006, p. 269). After the market recession in Ireland, the rate of increase of hours being spent working in the construction industry is the same (Vilken, et al., 2018, p. 302). The construction Industry practices in Ireland that determine the quality of the practices also expand to the individual roles of the people working in the construction sites (Sharma & Gadenne, 2002, p. 394). The quality control systems in place on construction sites in Ireland vary depending on the types of construction (Marinelli, et al., 2014, p. 201). For the small private developments and self-builders, quality control is something that the builder, the site manager, project manager or the self-builder is responsible for (Bernhard, 2011, p. 4). To ensure that their work meets the required standards, in practice Building Control Officers (BCOs) and inspectors from the warranty provider make visits to the site and provide some advice where they can – this is however not their role. The builder or the site manager is the one responsible for quality control but only where the contractor is the client.

For the large private developments, the main contractor is usually the client and a project manager, as well as a site manager, is usually present and responsible for quality control (Ashworth & Perera, 2018, p. 63). Again the BCOs and inspectors from the warranty provider may provide some advice but they are not required to do so. Their main concentration point is usually to finish the work as fast as possible to meet the minimum standard time required to satisfy the warranty provider as well as the BCO. The time emphasis has kind of gained traction in Ireland due to the pressures on time and finance as well as the lack of enough skilled
construction workers (McGuinness & Bennett, 2006, p. 268). In large private developments where the main contractor is not the client, the main aim is usually to create the site into projects such as apartment buildings and commercial spaces. The project manager and site manager for the contractor have to satisfy the client or their agents that the work done meets the standard required. The required standard is usually provided during the signing of the contract and therefore the project manager, site manager, and any assistant site managers or foremen must ensure that the required standards are achieved (Marinelli, et al., 2014, p. 204). For social and voluntary housing, the clients are mainly a local authority or a voluntary housing group – these operate almost similar to the large private developments as discussed above (Bernhard, 2011, p. 4). The clients usually provide their clerk of works to check the quality of the work of the contractor. A certificate of compliance may be issued by the architect to assert that the building is of acceptable quality (Ashworth & Perera, 2018, p. 69).

Quality assurance schemes are also present in Ireland - The National Standards Authority of Ireland (NSAI) is Ireland’s Standards body. Their job is to facilitate the development of voluntary standard documents and provide system certification services (Jackson & Bohrer, 2010, p. 83). The NSAI is responsible for the Timber Frame Manufacturers’ Quality Approval Scheme (TFMQAS) which consists of manufacturers who fabricate timber buildings. NSAI provides the material specifications, Manufacturing information and documentation, personnel training, production facilities, Site information and documentation (Ashworth & Perera, 2018, p. 74). The NSAI also provide onsite inspections to the local authorities.

Law regulations are also present in Ireland to regulate the construction companies. To start with, the design and construction of buildings are regulated under the Building Control Acts 1990 and it was formulated to ensure the built environment is safe for the people within it. There are 31
local authorities which are mandated under the Building Control Acts of 1990 to 2014. These authorities are tasked with ensuring compliance with the building regulations as provided by the same laws.

2.4.2. Construction Companies in Ireland

The one sure way of establishing the construction industry practices in Ireland is by taking a look at the construction companies that are present in the country. Doing so will also help to establish the quality practices that are used in the country since a bigger picture can be developed. By taking a look at their annual reports, one can easily establish how the ISO 9001 standards have been implemented and it will be easy to ascertain the impact of the ISO 9001 standards on the industry. Consequently, this will enable one to be able to measure the acceptance of the standards in the construction industry in Ireland. However, before the dissection of the annual reports for these construction companies in Ireland, it is important to first develop an understanding of the ISO 9001 standards.

ISO 9001 standards

To begin with, ISO which in full stands for International Standards Organization is a worldwide federation of worldwide standards bodies (Tarí, et al., 2012, p. 298). Standards bodies from over 160 countries are comprised in this non-governmental organization where they develop and promote the international standards for technology, scientific testing processes, working conditions, societal issues and more (Tarí, et al., 2012, p. 298).

What is ISO 9001?
This is simply a standard as developed by ISO that defines the requirements for a quality management system. It is a standard that applies to any industry and is used by organizations to demonstrate the ability to provide products and services that consistently meet customer and regulatory requirements (Heras-Saizarbitoria & Boiral, 2013, p. 52).

ISO 9001 is composed of requirements which are meant to guide the implementation of a Quality Management System. The provided requirements are broadly categorized into eight clauses. Five of these categories contain the compulsory requirements for a Quality Management System. The five clauses are; the general quality management system requirements (clause 4), management responsibility (clause 5), resource management (clause 6), product realization (clause 7), and measurement, analysis, and improvement (clause 8). Clause 7 is however different such that companies are allowed to exclude the portions that are not applicable. The first three clauses have no requirements actually but rather deal with the scope of the standard, references to support the understanding of the standard as well as terms and definitions.

**Application of ISO 9001 to Construction companies**

ISO 9001 standards are necessary in the construction industry for reasons that include the following; to standardize services and product quality, to reduce costs for the builder and to ensure continual improvement. The ISO 9001 can support these benefits through particular standards that specifically apply to the construction sector. The elements include;

Planning – the element of planning in the ISO 9001 is structured such that it encourages more specific strategic planning on complex building projects. It provides an enhanced focus of how risks and opportunities can be balanced so that the pre-identified objectives can be met in the construction projects (Heras-Saizarbitoria & Boiral, 2013, p. 56). For example, if the planning
element can help a 12-week project to be finished in 11 weeks, the financial benefits would be massive especially when multiplied for a trading year.

Supply chain management – this element is important since it can be used to improve the control of external services. It can help to do that through performance-management of the contractors and through ensuring that the supply chain meets the price requirements and the quality objectives concurrently. Doing so can bring about financial, quality and time benefits to a construction company.

Performance evaluation – this element is important since it would direct a construction company to analyze its performance over time while at the same time allowing attaining continual improvement through the already mentioned elements of improved planning as well as improved processes and performance (Heras-Saizarbitoria & Boiral, 2013, p. 59).

The process approach – this is an element that would enable a construction company to be able to pull together all the factors of a complicated project such as budget and time. The process approach would be useful in helping a construction company to stay within the limits of such factors.

Leadership – this element would be useful as it provides clear guidance on how to achieve excellent communication on the objectives and shared goals and also how to establish a great culture within construction projects which as a result would lead to the meeting of both financial and time targets which are crucial in the construction industry.

Win new customers – ISO 9001 is a selling point in that it provides a competitive advantage in the construction industry and would make a construction company be more trusted by customers.
The seven main principles of the ISO 9001 are customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, and relationship management.

**What is the difference between the ISO 9001: 2009 and ISO 9001: 2015?**

A new version of the ISO 9001 standards is created every seven years and different details are added or removed for the betterment of quality management systems. After a new version of ISO 9001, organizations are given a transitional period of three years during which they adapt their quality management to match their latest version. There is one major difference between ISO 9001: 2007 and ISO 9001: 2015 which is that the latter contains 10 clauses instead of eight like in ISO 9001:2008 (Fonseca & Domingues, 2017, p. 151). Below is a table that demonstrates the same;

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<tr>
<td>0. Introduction</td>
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<tr>
<td>Scope</td>
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<tr>
<td>Normative reference</td>
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<tr>
<td>Terms and definitions</td>
<td>Terms and definitions</td>
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<tr>
<td>Quality management system</td>
<td>Context of the organization</td>
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<tr>
<td>Management responsibility</td>
<td>Leadership</td>
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<td>Resource management</td>
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<td>Product realization</td>
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Apart from the above difference, there are other considerable differences within the clauses from the fourth clause onwards. The arrangement of the last seven clauses is in accordance with the PDCA cycle (Plan-Do-Check-Act). The same can be demonstrated using the following figure;

As can be seen, clauses 4, 5, 6 and 7 of ISO 9001:2015 are under PLAN, clause 8 is under DO, clause 9 is under CHECK and clause 10 is under by ACT. This new arrangement of the ISO 9001: 2015 is structured to give additional momentum to the continuous and systematic improvement of processes within organizations (Fonseca & Domingues, 2017, p. 153).
ISO 9001:2015 PUTS MORE FOCUS ON INPUT AND OUTPUT

There is more emphasis in ISO 9001:2015 on measuring and properly assessing the input and output of processes (Willar, et al., 2015, p. 95). According to ISO 9001:2015, one must closely monitor which articles, information, and specifications are involved in the production process. One must also clearly check whether good articles come out of the production process.

RISK-BASED THINKING IS AT THE CORE OF ISO 9001:2015

Risk-based thinking has a very important place in ISO 9001:2015. It encourages organizations to use risk analysis to decide which challenges are seen in the management of the business processes.

CONTEXT OF THE ORGANISATION IMPORTANT IN ISO 9001:2015

ISO 9001:2015 requires organizations to construct its quality management system from now on from the specific context within which it is active. This means, among other things, an organization has to take into account the needs and expectations of interested parties and evaluate and deal with internal and external strategic questions. The companies also have to show that, as organizations, they understand and respond to the expectations of all the parties concerned.

ISO 9001:2015 AND THE ENGAGEMENT OF INTERESTED PARTIES

In ISO 9001:2008, customers were often named as being the only interested party (Hiyassat, 2000, p. 196). This concept has been extended in ISO 9001:2015. Suppliers, personnel,
shareholders, legislative bodies, society, internal customers, etc. are now included as interested parties, in addition to customers.

**LEADERSHIP AND COMMITMENT IN ISO 9001:2015**

ISO 9001:2015 also places more emphasis on leadership and management commitment. It requires greater involvement by top managers and business leaders in controlling the quality management system. This way, ISO 9001:2015 is intended to encourage integration and harmonization with business processes and business strategies (Fonseca & Domingues, 2017, p. 155). The top management now has to take more responsibility for the effectiveness of the quality management system.

Because ISO 9001:2015 pays more attention to risk management, interested parties and the context of the organization, the quality management system also fits in better with the needs of the top management (Fonseca & Domingues, 2017, p. 155).

The quality management system is now more than ever a means for being strategically successful by addressing the needs of interested parties and by managing opportunities and threats.

Over the next pages, the annual reports for 15 construction companies based in Ireland will be under discussion. The following companies will be under review as to whether they have adopted the ISO 9001 standards, the impact of the standards on their quality management practices and finances, and the acceptability of the standards.

- Bennett Construction Ltd.
- John Paul Construction Ltd.
- Collen Construction
- Stewart Construction
- SIAC Construction
- Monami Construction
- Kilcawley Construction
- Conack Construction
• Clancy Construction  
• Purcell Construction  
• Glenbeigh Construction  
• MMD Construction Cork Ltd.  
• John Sisk & Son  
• Mercury Engineering  
• Jones Engineering

From the above companies, this section will seek to answer the following questions:

• The five quality management practices used in the organization
• Whether the company’s management practices enhances the capability of the company to attract new customers
• Whether the company’s management practices enhances the ability of the company to complete projects within budget and schedule
• Whether the quality management practices of each company has changed within the last ten years
• Have the changes in quality management practices enhanced the successful completion of the construction projects?
• Which quality management practices are utilized to increase productivity in the company’s projects?
• How receptive is the company to changes in quality management practices which would improve project performance of the company?
• Which are the major challenges that the company encounters in Ireland?

Bennett Construction Ltd.

Bennett Construction Limited is one of the construction companies in Ireland that boasts of having a broad portfolio of completed projects in sectors such as residential, residential,
refurbishment, and hospitality, commercial and industrial. Bennet speaks of itself as being client-focused and having a hands-on-approach (Radosavljevic & Bennett, 2012, p. 3). The company also describes itself as being attentive to detail and having an experienced team focused on ensuring client satisfaction. Bennett ensures that the team is experienced and reliable through vigorous vetting of the personnel. Client satisfaction is among the top factors that determine the quality of a construction project. The fact that Bennett has positioned that as a priority already says a lot about the construction company. Bennett also describes itself as a company that continues to invest in modern business practices and management techniques (McGuinness & Bennett (2006, p. 268). Innovation is described as being the center of the growth of their business and the company has set up different strategies to ensure continuous and consistent improvement in the company’s practices. Finally, Bennett seeks to provide quality projects and value for money to the clients.

In 2018, Bennett Construction Limited was ranked among the top four contractors in the Irish Linesight’s Handbook. In the same year, Bennett also took part in the CIF’s Construction Safety Week, where the main agenda was promoting the best practice in safety (Singleton & Cormican, 2013, p. 24). Bennett was also the first company to be awarded the NISO Gold Standard and the Safe-T-Cert. Bennett is much proactive about having the best practice in safety and well-being. Bennett Construction has developed its management systems which have been independently certified to AS/NZS ISO 9001-2008 – Quality Management Systems and claims to be committed to the accreditation. No record is present, however, of the company having transitioned to the ISO 9001: 2015 standards. Bennett Construction Company has its business model focused on having a repeat business with every client and therefore producing quality work for the first is a quality management practice for them. In 2017, Bennett Construction was awarded the
contractor of the year in the Irish Construction Industry. Within the last ten years, Bennett construction decided to limit itself to a certain number of projects at a time to ensure the integrity of quality to each project and productivity in the company’s projects. It also does this to ensure construction team continuity. The Irish Building magazine reports that Bennett demonstrated its ability to deliver on time and budget in 2011 when it was tasked with the construction of a 16,500m² central distribution warehouses in Naas for Penneys (Singleton & Cormican, 2013, p. 25). This year (2019), the Irish Times reports that the profits at Bennett construction have increased by 7% (Irish Times, 2019). One of the biggest challenges that Bennett seems to be facing is having more projects than it can handle (McCord, et al., 2015, p. 286). To handle more projects, Bennett increased its employees. Being a trusted contractor, the high demand for constructions in Ireland seems to be increasing the project traffic to Bennett construction.

**John Paul Construction Ltd.**

Enterprise Ireland describes John Paul Construction Limited as having a long-standing reputation for integrity, innovation, professionalism, and excellence. It also reports that the company was awarded the contractor of the year at the KPMG Irish Independent Property Excellence Awards in 2016 and 2017. John Paul Construction Limited first quality management practice to ensure delivery of quality projects and value for money to clients is prioritizing key project objectives as provided through the client needs. The company is committed to providing customer-focused integrated service and great construction experience to its clients. John Paul Construction Limited describes itself as being focused on providing a fully functioning project on completion of the construction. The company’s business model is purposed to producing defect-free and client-ready projects at handover and within the minimum lead time. The company is committed
to ensuring that clients’ projects are always completed within the schedule. The company states to have tried and tested management systems to ensure the delivery of fast track programs through detailed project planning, monitoring, procurement, and risk identification (Hamilton, 2019, p. 2).

To increase customer satisfaction, John Paul Construction Limited has excellent cash reserves and excellent credit ratings which ensure that the customers have peace of mind with regards to the financial aspects of a project. The company is also highly committed to sustainability and in ensuring that its projects have a minimum impact on the environment. The company boasts of having accredited and certified building environmental design standards. The company is continuously concerned with social and economic benefits to the communities in which it works. Innovation is also a critical aspect in John Paul Construction Limited; the company uses BIM to support off-site construction and modular construction (Comiskey, et al., 2016, p. 56). John Paul Construction Limited also stresses on the importance of teamwork between the company and the client to ensure the delivery of enhanced value-engineering and project innovation. John Paul Construction Limited utilizes a robust risk management system to ensure certainty in delivery to its clients (Singleton & Cormican, 2013, p. 23). The company quality management systems standards follow the IS EN ISO 9001: 2008; the environmental management system standards follow the IS EN ISO 14001: 2004; and the occupational health and safety standards are at purr with the OHSAS 18001: 2007 (Memish, et al., 2017, p. 214). There is no record of the company adopting the upgraded standard measures such as the ISO 9001: 2015. John Paul Construction Limited believes that the housing crisis in Ireland remains the biggest challenge even to them because of the high levels of expenditure required to fund the high demand for housing.
Collen Construction

Collen Construction describes itself as being widely known for its long-lasting relationships with clients, consultants, and supply chain members. The vision of the company is to deliver projects efficiently, effectively and to the highest quality standards. The company has the ISO 9001: 2015 accreditation in quality management systems. It prides itself in operating a quality management system which ensures that projects are delivered to the specification and timescale required by the clients (Osgood, 2018, p. 118). The company is very concerned about being the top contractor in Ireland providing client-focused services. Collen Construction is much concerned about the client feedback and has set up a system where it collects the feedback from the clients on undertaken projects to improve on future ones. The company also works to carefully nature the relationship between the company and the clients so as to ensure repeat business which helps improve the productivity of the company by minimizing the risk to below cost tendering. This is quite important in Ireland especially with the increase in construction prices due to the housing demand that has been consistently rising. To ensure productivity in the company’s projects, the company utilizes a structure of coordination in all aspects of a project including the mechanical and electrical parts. Collen Construction has in the past received an award for Innovation in “Workplace Health and Safety” in the 2014 Construction Industry Awards (Memish, et al., 2017, p. 214). The company utilizes modern safety systems and boats of having established a safety culture whereby the employees of the company will always make reports which they are sure will not be ignored. The management at Collen Construction places importance on continual improvement in establishing the best industry practices. The four main areas of focus of Collen
Construction are safety, quality, environmental awareness, and good management systems. The main challenge according to the management is ensuring that the company’s team is well coordinated in all its diverse projects. The company places a lot of importance on communication within the members and employees to ensure that productivity is always achieved. Within the last ten years, Collen Construction has increased its focus on the customer needs and this has pushed up the customer satisfaction and the perception of quality from the company in Ireland’s construction industry.

**Stewart Construction**

Cost-effectiveness, safety, excellent craftsmanship, and attention to detail are the biggest focus areas of Stewart Construction (Memish, et al., 2017, p. 219). The company also boasts of having high professionalism and providing projects of highest constructional quality. The company focuses on customer requirements and expectations and ensures to deliver the same. The Construction Industry Register in Ireland describes Stewart Construction as having an enviable track record in exceeding client expectations. Stewart Construction was named to be within the top 15 Irish Contractors in 2014. To ensure continuous productivity in its projects, Stewart Construction takes seriously the responsibility of partnering and employing well skilled and experienced workers to work on the clients’ projects. In 2016, the company took in an average of 15 more employees to ensure that it matches the increase in demand for housing in Ireland (Tansey & Spillane, 2016, p. 21). This has been the main strategic approach of the company to improve.

Stewart Construction has continuously reported an increase in revenue every year from 2009 which indicates an increase in productivity (Dubey & Gunasekaran, 2015, p. 379). In 2018, the
revenue grew by $1.6 million and the company attributed this to its commitment to building strong relationships and partners in the construction industry. The company also believes that great success comes with having the ability to timely and cost-effectively responding to the industry changes as well as the ability to respond to and implement technology changes. For this matter, the company speaks of itself as being a forerunner in the innovative design & build and turnkey projects. The company also states that flexibility and communication are key characteristics of the company which has often led to alternative design solutions which are more cost-effective and less harmful to the environment. On sustainability, Stewart Construction has in the past received an award on sustainability. The commitment of the company to sustainability is present through LEED Gold, BREEAM Excellent and other sustainable projects. The company managing director, Paul Stewart states that robust management and technology has been the key to the company’s provision of quality projects which are satisfactory to their clients and the Irish construction industry. Stewart has utilized technology such as information modelling to be able to undertake large-scale and complex building projects in a client-centered way (McAuley, et al., 2017, p. 22). The business development direct Rachel Stewart states that at Stewart Construction, the key has always been collaboration and communication to ensure that clients get the kind of quality that they need.

Stewart Construction is an Irish construction company with over 115 years of experience. To ensure the provision of quality, Stewart always strives to provide customers with completed projects which meet the required specification, drawings and details as per the agreed contract. The organizational sectors have the responsibility of ensuring that the requirements of the quality systems based on ISO 9001 are adhered to. The management ensures that the necessary resources have been allocated to establish, maintain and update the quality system. The company
states that the quality system is systematically reviewed and upgraded for the continuity if effectiveness and improvement in projects.

**SIAC Construction**

SIAC Construction describes itself as being Ireland’s leading construction company in delivering new and innovative contracts. Flexibility and innovation are stated as the prime considerations in all projects that are undertaken. The company is also committed to delivering projects within the schedule, within the budget and in a safe and environmentally friendly manner. On the company’s website, the company is described as always having operated with integrity and values. There are five values which SIAC states it believes in. they are;

- Total accountability to the clients
- Commitment to health and safety
- Care for the environment
- Continuous improvements in quality as well as the desire to be nationally and internationally recognized for the same
- Teamwork and long-term relationships

On health and safety, the management states the same to be a core responsibility. To achieve the highest standards in health and safety, the company has adopted safety statements and policies as well as comprehensive H&S management systems (Memish, et al., 2017, p. 218). The commitment to safety by the company has in the past led to it being recognized and awarded the following achievements; Distinction Award by the National Irish Safety Organization 19th

On quality assurance, SIAC Construction states on its website that it strives to exceed the requirements of the ISO 9001: 2008 standards. The company had received the accreditation for the ISO 9001: 2008 but the certificate was only valid until 2017 and there is no record of the company having received accreditation for the ISO 9001: 2015 standards. The company, however, states that it is working towards the accreditation of the same. To do this, the management ensures that for every project, the client’s requirements are met. The company also has each business unit being independently accredited to the ISO standards in addition to the internal auditing at project and head-office level. The company takes the responsibility of assessing the suppliers and sub-contractors to ensure that the services that they provide meet the quality requirements for the clients. The company maintains productivity by constantly adapting processes and procedures to the changing construction industry and the general business climate.

**Monami Construction**

Time and budget are the two factors that the Monami Construction Company gives the most weight. The company states that it strives to continually improve its quality processes and provide exceptional project management capabilities. The company strives to use innovation and proactivity to achieve continual improvement (Tansey & Spillane, 2016, p. 16). Monami Construction outlines its commitment to the ISO 9001 Standards of 2015 having received the accreditation. The company upholds the quality management system standards through the following:

- Ensuring projects are always delivered with quality standards
• Focusing on the requirements and the relevant regulations of the clients are met
• Empowering the staff through training and development support to ensure that they are competent for all the projects that they undertake
• Upholding a close relationship with the clients, suppliers, and sub-contractors and creating a team-work culture through the projects
• Following the good practices in all areas of operation

The above quality policies are then reviewed annually to ensure that they remain suitable for upholding quality in the company’s projects. The company is also supportive of good environmental practices. The company is committed to making efficient and environmentally responsible use of energy and resources as well as to influence major suppliers to minimize the negative impact of their operations on the environment.

**Kilcawley Construction**

Kilcawley Construction Company is structured to uphold quality through its commitment to the following: Being part of the client’s team; utilizing the latest construction techniques, equipment and materials; thorough detailing of projects; committed project management; clear and focused project goals; project delivery within schedule and budget; continuous improvement and education to employees. Kilcawley considers quality to be a very important aspect of its business model and therefore states that it utilizes a quality system that meets the customers’ specifications and any statutory regulations as required in any contract. The company utilizes a cost quality management system to be able to achieve its quality aspirations for its projects (Dubey & Gunasekaran, 2015, p. 374). At the company, employees are tasked with being
responsible for the quality of their work. A quality cycle has been set in place to ensure that quality is maintained in all projects. The quality cycle can be shown through the following demonstration:

The management is then responsible for ensuring that the policies and controls are endorsed. The management declares its dedication to ensuring continuous monitoring and updating of the quality system. Continuous improvement is the central pivot of the quality system updates and all employees are engaged in ensuring that an environment of mutual trust and respect has been created. The management reviews the quality system and the objectives annually to ensure that they are purr with the current industry standards. The quality objectives are then communicated and maintained at all levels of the organizations. The company does not have the ISO 9001: 2008 or ISO 9001: 2015 standards accreditation. The company is nonetheless also committed to health and safety in its operations. The company upholds a safety culture and is committed to Safe-T-Cert Accreditation.
Conack Construction

Conack Company describes itself as being fueled by enthusiasm to build a futuristic company. The company is committed to ensuring the highest standards of workmanship on every project through the provision of detailed attention (Tansey & Spillane, 2016, p. 21). The company states that it is committed to working with clients and their design teams to ensure that customer satisfaction supersedes everything else. The company prides itself in having repeat orders from clients who have been satisfied with the quality of the previous projects undertaken by the company. The company states that it works tirelessly to provide proactive, innovative and flexible solutions to all projects that it undertakes.

Clancy Construction

This Irish construction company describes itself as being highly concerned with the objectives of any particular project and the client concerns about any particular aspects of the project. The company’s quality management system is based on listening to the client. The company also states that it is concerned with completing every project within the agreed timelines and budget. Clancy construction has built its reputation as being well experienced in all construction sectors such as commercial, public sector, and residential developments. Efficient management and a high standard of workmanship dictate the quality standards in the company (Wickham & Bobek, 2016, p. 6). The management takes responsibility in ensuring that quality has been upheld throughout a project and invites the clients often while undertaking the project to ensure that the client is satisfied with all the aspects of the project. Integrity, innovation, and passion describe
the team of Clancy Construction. The management is very cautious about the employees who are hired in the company since the company understands that the employees determine the quality of a project to great lengths. Clancy sets up a team to keep up constant communication with clients throughout their projects to ensure that every project has been highly personalized to serve the client’s needs. The company is however not accredited to the ISO 9001 standards.

**Purcell Construction**

Purcell Construction envisions itself as being the leading contractor in the enhancement of the skills of its employees and in so doing be able to serve the clients better. Apart from being focused on self-improvement, Purcell Construction is also client-focused. The management states that the client values are given priority in any construction project. The company management stresses the importance of establishing trust with the clients as well as commitment with them. The quality management system for this company is, therefore, more emphasized on communication with the customer to ensure their satisfaction by the end of each project (Dubey & Gunasekaran, 2015, p. 375). The company states that it understands that satisfied customers are the key to growing and scaling the business and therefore customer satisfaction is a key focus of the company. The quality management system in this company encompasses a non-tolerance for compromise on safety or quality. On safety, the company is focused on ensuring that the well-being of the employees is upheld by nurturing a behavioral culture where employees take charge for their safety and that of others such that they cannot ignore what is unsafe. The quality management system of the company also emphasizes integrity to uphold quality; the company holds a code of transparency in projects to clients for their benefit and the benefit of the Irish construction industry. The company appreciates the power of innovation in quality management.
As such, the company regularly assesses its operations to ensure that it is conscious of the changing nature of the operating environment and that the company is well equipped with construction solutions for the needs that are presented to suit specific client needs. The company does not hold any accreditation to the ISO 9001 standards.

Glenbeigh Construction

Building Ireland magazine describes Glenbeigh Construction as being one of the youngest construction companies that have grown to become one of the most leading contractors in Ireland (Wickham & Bobek, 2016, p. 3). The magazine attributes the success and popularity of the company to their ability to tailor services to the changing needs of their clients. The magazine also reports that Glenbeigh Construction has worked hard on accreditations and has been accredited with ISO 9001 (Staronova & Löffler, 2017, p. 188). The company, on the other hand, attributes its success to its professionalism and its commitment to meeting and exceeding the expectations of their clients. The company has 6 values which outline its quality management system. The six values are; client satisfaction; commitment to client’s goals; repeat workflows, empowering everyone in the organization with a voice; encouraging proactivity in seeking innovative solutions and positive outcomes; and flexibility in problem-solving and innovation (McAuley & Carroll, 2017, p. 7). The management describes the company as being client-driven and one that values continued growth in a measured manner. The company outlines that its biggest challenge is the shortage of workers in the industry and states that the challenge is more likely to continue since the rates have not improved much in Ireland since the recession (Treacy, et al., 2016, p. 25)
MMD Construction Cork Ltd.

This Irish construction company is one of the few that is committed to the ISO 9001 standards of a quality management system. The company strives to comply with the requirements of the latest international standard on quality which is the ISO 9001: 2015. This company was, in fact, the first construction company in Ireland to receive the accreditation. The company’s commitment can be demonstrated through its formal operating procedures which have been set out in compliance with the ISO 9001: 2015 quality management system. MMD Construction Limited is committed to complete every project as the client requires it; the management explains that the company has a system whereby the client requirements for a project are always evaluated before, during and after a project. MMD Construction Limited is less than twenty years old yet it is already recognized in Ireland as being one of the top quality producing construction companies.

John Sisk & Son

John Sisk & Son Construction Company describes itself as being committed to creating projects with exceptional quality. To achieve this, the company states to have refined its quality control processes while at the same time engaging its sub-contractors on the same. The company is dedicated to continual improvement of its employees’ skills and improvement of its processes which ensure that the company delivers quality projects that exceed the expectations of the clients. To increase productivity in the company’s projects, the management has a quality cycle set up for operation that engages everyone in a project from the designers to the contractors and sub-contractors and even project inspectors. The quality cycle includes quality planning, sub-contractor evaluation and supervision, inspection and test plans, package owners, auditing and
maintenance plans. Rigorous planning, testing, supervision, and sign-offs are some of the aspects of the company’s quality management system that stay in place to ensure customer satisfaction (Treacy, et al., 2016, p. 26). The company has in the past received accreditation for ISO 9001: 2008 quality management standards. The company is also committed to ensuring that projects have minimal negative effects on society and the company, therefore, upholds the standards provided by the ISO 14001: 2004 accreditation (Staronova & Löffler, 2017, p. 188).

**Mercury Engineering**

Mercury Engineering is a company that is certified to ISO 9001: 2015. The company management states that it is continuously working to exceed the standards provided by the ISO 9001: 2015 certification. To achieve quality in its projects, Mercury Engineering places more emphasis on two aspects which are client focus and innovation (Treacy, et al., 2016, p. 23). The company considers the clients to be strategic partners and consults them during their projects to ensure that they are satisfied at every step. In innovation, the company has been proactive about integrating digitalization, offsite manufacturing and safety to ensure quality (Wickham & Bobek, 2016, p. 3). The company ensures an increase of productivity in its projects by adopting the modern, innovative ‘smart’ production techniques which are intended to save time and costs of a project while at the same time increasing safety and quality. BIM, lean, off-site fabrication and modularization are some of the techniques that are utilized. The company is certified to the highest standards of BIM having received the BSI Kitemark for BIM Level 2 accreditation (PAS 1192-2:2013 & BS 1192:2007+A2:2016) in 2018. The company has heavily invested in ensuring that safety measures are taken in all projects. This has been done through education of
the employees to ensure adequate coordination and communication (Memish, et al., 2017, p. 214).

**Jones Engineering**

Jones Engineering is an Irish construction company that has been certified with the ISO 9001: 2015 accreditation. The quality management system of the company is such that it conforms to the requirements of the ISO 9001: 2015 standards but also strives to exceed them. The company’s quality management system emphasizes on projects being customer-oriented. In addition to this, the management recognizes the importance of employees in upholding quality standards in projects. Therefore, the company is careful with picking only qualified personnel to deal with projects. The quality management system of the company requires that the company has a quality manager in charge of each project being undertaken to ensure that the company’s quality standards have been met and that also the requirements of the client have been upheld throughout the project (Dubey & Gunasekaran, 2015, p. 375). Jones Engineering was also presented with the Safe T cert in 2006 and takes a lot of consideration to ensure that the workers are safe while working on client’s projects. The company has also achieved Building Information Modelling (BIM) Level 2 Certification for Design and Construction from BSI (British Standards Institution) (Comiskey, et al., 2016, p. 56). The company recognizes the importance of innovation in upholding quality in its construction projects.
CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

This chapter describes the research process and the methods that were used in developing the answers for the research questions. The various stages of the research are also described in this chapter. The stages include the selection of participants, the data collection process, the process of data analysis, and challenges incurred during the stages. This chapter also discusses the validity and reliability of the qualitative research methods and the resolution that was taken in this research with regards to answering the research questions.

This research explored the quality management practices in the construction industry in Ireland. Interviews were considered as the primary source of the qualitative data in answering the research questions. The interviews involved dialogue between the researcher and the participants.

In this section, we are going to use Saunders’ research onion to analyse the different aspects of the research methodology. It will contain an outline of the methods of data collection and analysis, as well as the limitations that will be encountered in carrying out this research.
3.1. Research Design

This section is going to identify the general plan that will be followed in answering the research question. It consists of the sources of data collection in the research, data collection techniques, data analysis, and the limitations of the research. In addition, ethical issues faced in the course of the research, as well as the constraints and limitations are discussed in details here (Saunders, et al., 2016, pp. 163-165).

At the end of this section, we are going to have answers to the techniques that will be used in gathering data from the Irish construction industry, the population to be sampled in the industry, and how we are going to handle the time and cost constraints (Blumberg, et al., 2014, p. 153).
3.2. Research Philosophy

Research philosophy refers to the beliefs and assumptions surrounding the development of knowledge about the research topic (Saunders, et al., 2015, p. 124). In the course of every research, there are going to instances where assumptions will have to be made. However, those assumptions the researcher makes might be based on human knowledge (epistemological assumptions), based on realities faced in the research (ontological assumptions), or based on personal values (axiological assumptions) (Saunders, et al., 2015, p. 124).

The research philosophy used in this research is interpretivism. This is a branch of epistemology that involves the researcher interpreting different people’s ideologies in the course of the research, and integrating those ideologies to form a theory (Research Methodology, 2018). This research philosophy is a reflection of the researcher’s interpretation of the study conducted and is focused on individual perceptions and opinions (Saunders, et al., 2015, pp. 132-136).

It is imperative to use an Interpretivism approach for this study due to the qualitative nature of the research. Saunders, et al., 2015(p. 140) stated that ‘the purpose of the interpretivist approach is to create new, richer understandings and interpretations of the social world contexts’. As this research question is focused on identifying the quality management practices currently used in the industry, an interpretivist approach is necessary to gain information from quality managers in different companies and derive a general meaning from the data collected.

An Interpretivism philosophy enables interviews to be conducted, as the research relies on interpreting personal opinions and judgement from quality specialists in the industry. The interviews will be the main source of primary data collection as a lot of information required for the research depends on specialists’ perception of the existing level of quality in the construction industry.
3.3. Research Approach

The research approach used in this study is the inductive method. The research is aimed at identifying patterns from the interviews conducted with quality managers and specialists in the construction firms. We are looking to generate a tangible meaning from the data collected that would answer the research question and help propose suitable quality management practices to the firms.

The inductive approach is much different from the deductive approach and abductive approach as it involves the generation of theories with the aid of accumulated data. Unlike the case of deductive approach that involves the verification of existing theories, and abductive approach that involves the generation of new theories as well as modification of existing theories (Research Methodology, 2019).

In addition, interpretivism philosophy is typically inductive as it involves interpreting small samples of in-depth interviews and analysing the data obtained qualitatively (Saunders, et al., 2015, p. 136).

3.4. Research Strategy

Research strategy refers to the plan of action required to answer the research question, which will link the research philosophy and the chosen data collection techniques and analysis (Saunders, et al., 2015, pp. 177-178). The research strategy used in this research is the case study. The case study is the best fit for this research as we are seeking to analyse the quality management practices used within the Irish construction industry. This research is an exploratory study as it is going to involve conducting in-depth interviews with quality experts as well as quality managers in construction firms to discover the quality management practices used in the industry. The
research is aimed at finding solutions to the problem of quality inconsistency in the construction industry. A case study research enables us to gather insights from intensive research of the quality management practices used in the construction industry, and hence develop a meaningful theory as to why quality is not being fully attained. As this research is qualitative, we are going to extensively use interviews to gather information to justify the inductive approach of this study.

3.4. Research Choice

The research methodology is best determined by the nature of the research question and the matter under investigation (Bakar, et al., 2011, p. 286). One could, therefore, infer that research method is simply a tool used in answering the research question. The aim of this thesis was to develop an understanding of the quality management practices in Ireland and whether they are working or not. The research also wanted to establish whether the standards of these quality management practices in Ireland are at purr with the international standards. The research intended on establishing whether the Irish construction companies have been accredited with the ISO 9001 standards. The choice of research methodology was therefore guided by the research question.

A qualitative approach was chosen to answer the research questions because first, the research questions needed an understanding of the construction industry perceptions which are subjective to individuals’ judgements and preferences. A qualitative approach was also chosen because of its high response rate and also the fact that this research was the first of its kind in Ireland and needed to obtain first-hand information from individuals in the construction companies in Ireland.
3.5. Justification of Research Choice

Qualitative research can be described as a multifaceted research strategy that involves both an interpretative and naturalistic approach to the subject (Bakar, et al., 2011, p.286). This characteristic of the qualitative approach allows a researcher to be able to gain a holistic understanding of the issue in question. The following are therefore the reasons why a qualitative strategy was chosen for this research;

- Qualitative research takes a holistic approach and the research needed an understanding of the quality management systems in the whole of Ireland
- Qualitative research provides an understanding of the relationships in a system – in this case, the whole construction industry
- Qualitative research makes it possible for a researcher to test his or her own biases regarding an issue which was inherent for this research
- Qualitative research addresses all the ethical concerns regarding consents
- Qualitative research is exploratory rather than explanatory which was crucial for this first time research
- Qualitative research provides a meaning attached to the acquired experiences

Company management personnel were the main targets for this research. Top-down segmentation was applied in qualitative research. The aim of using qualitative research was to be able to come up with findings without presenting them as the absolute truth but rather to be able to construct a picture about the quality management practices in Ireland at the current time since the industry is a continuously changing one.
Traditional qualitative research employs three methods of data collection which are; participant observation, interviewing and use of personal documents (or use of case studies) (Bakar, et al., 2011, p.287). In the first approach, interviews were selected as the more appropriate approach to qualitative research. The use of interviews was selected as the first option because of the following reasons;

The presence of non-verbal cues which can be utilized during a one-on-one interview

Interviews allow for an open in-depth discussion on the issue at hand

Unstructured interviews may provide an understanding of the complexity of the issue at hand without the imposition of prior categorization

Interviews enable researchers to be able to draw more sources of information on the topics being investigated

Participants would be more comfortable sharing information about their company practices because of the personal touch imposed through interviews.

### 3.6. Sampling

Qualitative research traditionally focuses on relatively small samples. Nonetheless, there are still many types of sampling which could be used. The research participants are usually selected in qualitative research based on their ability to provide rich descriptions from their rich experiences associative to the matter being investigated (Jaafari, et al., 1996, p. 161). Using that reasoning, the researcher also employed the same method in sampling. In this research, the participants who were needed were construction companies specifically from Ireland. The researcher needed to identify the Irish construction companies which would give an intricate understanding of the quality management practices which are being used so the finding could be applied on a large
scale basis. The sampling strategy that was used was, therefore, identifying the top-performing Irish construction companies. Web-based sources were employed in order to identify the top-performing Irish companies. In qualitative research, the exact number of participants could not be specified before the study began but in this case, the researcher decided to go with 15 companies. The construction companies that were identified were:

- Bennett Construction Ltd.
- John Paul Construction Ltd.
- Collen Construction
- Stewart Construction
- SIAC Construction
- Monami Construction
- Kilcawley Construction
- Conack Construction
- Clancy Construction
- Purcell Construction
- Glenbeigh Construction
- MMD Construction Cork Ltd.
- John Sisk & Son
- Mercury Engineering
- Jones Engineering

3.7. Data collection

Based on the research questions, the following questions were identified for the interviews with key personnel from each of the identified companies.

- What are the top five quality management practices currently used in your organization?
- Do your company’s quality management practices enhance its ability to attract customers? Can you provide examples?
- Do your company’s quality management practices enhance its ability to complete projects within budget and schedule?
• Have your company’s quality management practices changed in the last ten years? If so, why?
• In your opinion, have the changes in quality management practices over the last ten years enhanced the successful completion of construction projects? Can you give specific examples?
• What are the quality management practices you recommend to improve productivity in the construction industry?
• How receptive will your company be to quality management practices that would improve project performance in the company? Can you give specific examples?
• In respect of quality management, what are the major challenges encountered in the construction industry in Ireland?

3.8. Research Ethics

Saunders, et al., defined research ethics as the behavioural standards that researchers must follow in relation to the rights of everyone involved in the research (2015, pp. 239-240). As with any research, there are rules and regulations that were adhered to during the course of this research. It is imperative to the researcher needs to follow the ethical principles along the course of the research.

This research was carried out with respect and integrity, at no point of the research did the researcher stray from these ideologies. It is very important to engage in research with truthfulness and avoiding deception (Saunders, et al., 2015, p. 243).

The interviewees were anonymized to respect their privacy. To protect their rights of privacy, each interviewee was completely anonymized in the entire course of the research.
Approval was obtained at all levels required before proceeding to record the interviews with the quality personnel. I was granted full access at the beginning of each interview before proceeding to record the conversations.

At no point of the research was any participants of the research in harm’s way. Adequate care was taken to ensure confidentiality was maintained all through the research. In cases where certain participants were no longer willing to participate in the research and decided to withdraw consent, adequate care was taken to ensure that no one was coerced to take part in the research.

3.9. Research Limitations

For this research, although interviews were designated to be the main the method of data collection, key challenges made the data collection to be difficult and thus in the discourse, another method of data collection had to be selected. The challenges that became eminent with the interview method of data collection in this research were;

*Inability to Secure Interviews*

There was special difficulty in securing interviews with the Irish construction companies due to certain unforeseen circumstances. The annual Builder’s holiday that usually kicks off every August was moved to July this year, unsuspecting to the researcher. This is a period of peak research activities, the researcher visited several offices to no avail. Most construction sites were also empty as activities were temporarily suspended. There was a huge absence of construction personnel to be interviewed and this caused a major setback to the research. The researcher had to seek guidance from the research supervisor on how to proceed.
Distance

Although all the construction companies were in Ireland, their headquarters were not particularly in the same geographical location. Distance brought around other associative challenges such as time constrictions and financial constraints with travelling.

Decline to be involved

Although the research did not present any reasons for the construction companies to decline being interviewed, some of them declined the invitation claiming their internal policies did not allow for such. This was a shock to the research since all consent issues were addressed in the invitations that were sent to the companies in question.

Setting of interview

The location of an interview is an aspect of data collection which can affect the quality of the process (Love, et al., 2000, p. 109). Respondents are more likely to decline an invitation to interview if by any chance they perceived the identified venue and time of the interview negatively (Love, et al., 2000, p. 109). The difficulty in determining the locations and time schedules that would serve the participants best-made interviews as a mode of data collection hard to pull through.

Other reasons

There were also other reasons such as the researcher’s tiredness that made the data collection through interviews to become a mismatch for the research. The period of data collection was also
limited and therefore since the different participants were from different places and scheduling would in given instances take weeks, interviews were not the appropriate method for data collection in this research. Interviews in general also pose problems with their difficulty in setting them up, transcribing them, analyzing them and reporting them. The costs of doing interviews were over the roof, especially in this case.

3.10. Case Study Approach
The absence of primary data due to the lack of interviews has caused the researcher to decide to take a case study approach for this research. The use of case studies or use of personal documents was decided to be more appropriate since most of the research questions could be answered from them.

Case study research deals with an in-depth analysis of a particular phenomenon, drawing useful information by relating various instances (Denscombe, 2010, p. 52). Unlike the regular research where variables are manipulated to draw a significance, a case study research involves a thorough investigation into a phenomenon. Generalizations are then made from the observations in the case study (Blaxter, et al., 2010, p. 72).

When to use a case study
A case study research is used when the researcher aims to investigate deeply and provide analysis that describes what is happening in a particular setting (Denscombe, 2010, p. 55). In this case, we are using the approach to explore the key issues surrounding quality in the Irish construction industry.
In addition, a case study approach is more aligned with qualitative research of this nature rather than quantitative research. In this research, the annual reports from the pre-identified 15 Irish construction companies provided a lot of information on their quality management practices over the years. The company websites were also useful in providing information about how the companies perceived quality in construction and the practices they employed in return in order to achieve given levels of quality management. The annual reports, the company websites and other construction-related websites also provided information about quality standards in Ireland’s construction industry and how key personnel from the different construction companies achieved productivity.

3.11. Benefits of Case Study Approach

One of the most significant benefits of a case study is the ease of data collection and its accessibility (Blaxter, et al., 2010, p. 74). In addition, the insights provided by a case study research enables the researcher to build on the actual practices in the construction industry (Blaxter, et al., 2010, p. 74). Employing the case study approach in this research allowed an in-depth investigation into the Irish construction industry and extract information, one which might not be accessible through a survey or interview (Denscombe, 2010, p. 53).

Collecting the data through case studies allowed the researcher to be able to make intensive study in a way that would not have been possible with interviews due to time limitations. Case studies also allowed for continuous analysis in that reference could easily be done for any issue that needed clarification without the cost factors coming into play. From the annual reports of the companies, comparisons could easily be done in order to obtain a holistic picture of the quality management practices in the Irish construction industry. The use of case studies is a
comprehensive method of data collection and one can easily cover every aspect of a research question by exploring it from different perspectives (Love, et al., 2000, p. 111). The annual reports were more suitable for this research because they made it possible to be able to identify the deviant construction companies whose quality management practices did not represent the complete picture of the industry practices in Ireland.

3.12. Limitations of Case Study Approach

As with every other research approach, there are certain limitations that are encountered. One of the most likely weakness of the case study approach is the ‘credibility of generalizations made from its findings’ (Denscombe, 2010, pp. 62-63). It is often common to encounter unreliable information during case study research, which could lead to unsubstantial assumptions. However, the researcher ensured this was not the case as proper time was invested to demonstrate similar cases as to that of the Irish construction industry.

Contextualizing the research is also a challenge posed by case study research, as it can prove difficult to know where contexts begin and end in cases (Blaxter, et al., 2010, p. 74). The researcher took adequate steps in getting the right contexts in the annual reports of the construction companies.
CHAPTER FOUR

FINDINGS, ANALYSIS, AND DISCUSSION

4.0. Introduction

Based on the methodology that was applied in this research, this section reports the findings of the study. This research was purposed to evaluate the significance and importance of quality management in the construction industry, to identify and analyze the effectiveness of the quality management practices currently used in the Irish construction industry and to identify potential quality management practices that will help improve the quality in the construction industry in Ireland and globally as well. In this section, answers to the following research questions will be provided as obtained from the 15 companies that were under study. The research questions were;

3. What is the current situation of the Irish construction industry?

4. What are the major challenges encountered in the construction industry in Ireland and what is the impact of quality on the industry practices?

5. Which quality management practices are being employed in Ireland construction companies and how effective are they?

6. What is the significance of quality management practices in the successful completion of construction projects?

7. Which quality management practices are best recommended to improve productivity in the construction industry?

8. How can the recommended quality management practices to improve project performance be easily integrated into Irish construction companies?
4.1. The Irish Construction Industry

From the research, it became clear that the Irish construction industry is growing at a very fast pace. The industry had been held back by the 2008 recession and it seems to be putting commendable effort to catch up. Numerous projects have been underway in Ireland and several sources predict that by the end of 2019, the Irish construction industry will have grown by 20% (Horan, et al., 2019, p. 558). In 2018 and 2019, there have been increased investments channeled towards the construction industry and predictions show that the same trend is more likely to continue into the future.

However, in trying to understand the quality management practices in the construction industries in Ireland, one thing became clear; the Irish construction industry has a slow reaction to the speed of change of the global construction industry (Singleton & Cormican, 2013, p. 24). To begin with, this research found that the Irish construction industry is highly fragmented. The industry encompasses the likes of clients, financiers, contractors, designers, government agencies and other related groups. While this may not be so different from the construction environments in other countries, in Ireland, this factor has made the change to be particularly slow. One specific example that shows how slow the change is, is the adoption of the ISO 9001: 2015 standards. Out the 15 Irish construction companies that were under research, only six of them had been accredited with the ISO 9001: 2015 standards. Out of the remaining 9 companies, only three of them had previously been accredited with ISO 9001: 2008 standards and they have never managed to move to the ISO 9001: 2015 accreditation.

The speed of change of the Irish construction industry with regards to the quality management practices has also been slow because of the way Irish construction companies approach projects. It was clear that for most of the construction companies under investigation, projects are mostly undertaken with a defined budget and time frame. While this may be
advantageous in other aspects, the fixed budget has been imposing a growth limitation on the Irish construction industry (Singleton & Cormican, 2013, p. 26). The products being produced by the Irish construction industry are sort of one nature. This consequently has led to low competitiveness in the Irish construction industry and as such the industry has not been able to keep up with changes in the global construction industry.

The construction industry of Ireland has been growing very slowly also because of the quality management practices with regards to technology and innovation (Peace, et al., 2010, p. 16). Most of the researched companies were open to innovation and technology. Additionally, some of them claimed to apply pieces of technology at sites and so on. However, in Ireland there is a lack of coordinated progress in matters of innovation and technology and, therefore, the industry as a whole has not been able to register growth in the same direction. The vast majority of the Irish construction industry has not yet embraced the strategic advantages of technology and innovation. For example, out of the 15 companies, only three had fully integrated Building Information Modelling into their operations. Mercury Engineering being one of them stated that BIM helps them to navigate around projects that may be termed difficult to be able to deliver quality projects. If the same percentage, \((3/15) \times 100\% = 20\%\), can be extended to the entire Irish construction industry, it clearly shows that the quality management practices with regards to technology and innovation are not at purr with the global construction industry.

Change has always had long term effects. The Irish construction industry does not suffer from not being informed but rather from the mindset problem. A few of the top construction industries in Ireland operate in the entire UK and therefore latest management concepts and new technology are readily available and the managements are readily informed. Nevertheless, they are reluctant to apply new concepts. Perhaps, the Irish construction companies still feel like they
are lagging behind because of the recession and are therefore not optimistic about taking on the change too early. However, the same would not be advised. The Irish construction companies need to take a more global view of their operations and they also need to shift their emphasis from individual projects to a more entrepreneurial approach.

From the research, the main challenges that are more predominant in the Irish construction industry all have to do with the rising demand for housing in Ireland. For Bennett construction limited, the number of employees has been increasing steadily over the years because of the constantly increasing number of projects being handled at any particular time. For them, therefore, the main challenge has been keeping up with the housing demand in Ireland (Irish Times, 2018). Other companies expressed the main challenge being a shortage of workers to work on projects. This research was able to establish that the construction industry in Ireland suffers from a shortage of workers. The construction industry is not particularly attractive to the younger generation perhaps because of how the industry was affected by the recession ten years ago. There is a need in Ireland to convince more people to take up construction careers (McGuinness & Bennett, 2006, p. 269). On the same note, team coordination also seems to be a challenge in Ireland. The high fragmentation of the industry requires the managements for the construction companies to be well set up. The construction laws and regulations in Ireland add to the challenge as well.

4.2. Quality management practices in Ireland

Quality management is something that is subjective to the different opinions of people. The Irish construction companies also have varying perspectives about quality as well as quality management practices. The perception of quality in Irish construction companies was found to be centered on the teamwork (Tansey & Spillane, 2016, p. 23). For most companies, the quality of
their projects highly depend on the experience of their team. For this reason, these companies constantly mention the age of their company in bid to be more competitive. The older the construction company, the more the management is confident in its own ability to produce quality projects. Team coordination, integrity, passion, innovation, and communication are some of the aspects of a team that the Irish construction companies tend to associate correlatively with quality projects (Irish Times, 2019). As quality management practices, Irish construction companies invest in the education and advanced training of their teams. Despite this, only three companies were upfront about embracing feedback from the employees and actually listening to them. For most of the companies developed training programs do not exist. There were no programs whatsoever to empower employees in decision making regarding the operations. These companies also do not collect data to measure the performance of operations of employees. The management for these companies are very much concerned with having team continuity. A few of the companies have set up their business models to encompass clients into a part of the team such that the client has to continuously assess a project as a measure to ensure that quality is upheld.

In Ireland, quality is also subjective to the opinion of the client. For all of the companies under research, it was clear that customer satisfaction was a top goal for the company. Customer satisfaction is interpreted as the project being of quality. The quality management practices surrounding this perspective are a number. Some companies have integrated the clients into the team such that the client scrutinizes a project, before, during and after its completion to ensure that every aspect of the project is satisfactory. Other companies offer free makeovers to clients if they find any faults in their projects. Whatever the means, the Irish construction companies seem to undertake customer satisfaction as a quality management practice.
Pursuant to customer satisfaction, the Irish construction companies rank the cost of a project, the scope of the project as more important than quality in project success. All 15 Irish construction companies declared their commitment to finishing projects within time and budget. In Ireland, quality is therefore also perceived as the ability to finish a project within budget and schedule. Additionally, due to the housing crisis, every company seems to be racing to complete each project so as to be able to undertake more projects (Lynch & Tucker, 2013, p. 183). The Irish construction companies perceive quality as important to their own success in the industry, hence the need for them to undertake as many projects as possible and finish them within budget and schedule. It was clear in the research that most of the Irish construction companies are aware of quality management practices, but did not consider them as a selling point to the market. ISO 9001 accreditations, on the other hand, seem to be a good selling point for those Irish contractors who have acquired them. Although some of them communicate their intention to surpass the ISO 9001 standards, none of them provides acute standards which will help achieve the same. Safety standards have also been adopted as part of a strategy to be more competitive and not to produce quality projects. Innovation methods such as the use of off-site fabrication and construction were utilized by some of the companies. However, the main purpose of such innovation methods was cost-cutting to ensure that projects are completed within the budget. In conclusion, therefore, the quality management practices in Ireland are subjective to how quality itself is perceived. Quality is perceived as having a great team and being able to complete projects within cost and schedule. This is the same approach to quality that the Irish construction industry also used in the past.
CHAPTER FIVE

5.0. RECOMMENDATIONS

Quality in the construction process is definitely linked to the team on the ground. Even with great design conceptualization, the team on the ground is the main determinant on the quality of the project once it is completed (Wickham & Bobek, 2016, p. 21). The first recommendation for improvement of quality management practices is for the Irish construction companies to restructure their approach to teamwork and improving the team. The Irish construction industry as identified is highly fragmented and therefore, for one single project, there could be dozens of people from different companies. Irish construction companies understand the importance of providing training to their teams however the fact that the industry is much fragmented could be reducing the quality of the projects. Each team taking up a project should be considered as an organization of its own and accorded training as such. The project organization should be treated as capable of learning and improving during the currency of the project even though the adaptation to the learning would vary from project to project. Irish construction companies need to find ways of motivating the team members of any project to engage as members of a single organization with a clear vision and uniformity of objectives and cultural consistency. Irish construction companies also need to offer and engage employees and the team on project-specific training. This may be particularly useful for projects that encompass complex or technically complicated activities.

Still on the team, the second recommendation is for the Irish construction companies to set up structures that will allow for the team members and employees to communicate suggestions and feedback to the management, structures that will allow the employees to be engaged in the decision-making processes and structures that will allow employees to measure the effectiveness
of their suggestions. Irish construction companies also need to set up performance evaluation structures that will ensure all employees comply with the quality standards as established by the entire team. Effective communication, therefore, goes without saying that it is an essential element of quality management (Dubey & Gunasekaran, 2015, p. 379). Channels and processes of communication need to be set up so that the human factor can be aligned with the missions and goals of a project and also of the organization.

Quality cannot be improved without innovation and embracing innovation (Peace, et al., 2010, p. 16). This research recommends that Irish construction companies embrace innovation more. As a strategy, the companies may have to use education and retraining. This will be particularly important so as to integrate innovation methods such as BIM and off-site construction into projects. Innovation is important since it predominantly helps to cut on costs and improves on the time-length completion of a project. Finally, Irish construction companies need to create a shared vision that embraces quality management practices which consequently improve the construction processes enhances the team culture and subsequently improves the quality of projects.

5.1. CONCLUSION

In conclusion, quality management practices are not news to the Irish construction companies. In fact, most of them are pro-active to undertaking such practices. Aside from the challenges in the Irish construction industry in general, the perception of quality in Irish construction companies is also somewhat distorted. Most of the construction companies interpret project completion within time and budget as the quality of the project. Additionally, the companies also base their capability to produce quality projects on their accumulated time of operation rather than in the practices they undertake in projects. The team is an important aspect of quality in Irish
construction companies. The quality management practices associated with the team includes training them, educating them and developing them. A few of the companies have structures to actually empower the employees or the general team to take part in decision-making processes and to provide input with regards to specific issues and projects. Of all identified ways of increasing productivity, improving communication within the team is the most rewarding quality management practice. Finally, most of the Irish construction companies are not very receptive to changes in quality practices and if the quality is to improve in the Irish construction industry, the same has to change.
REFERENCES


APPENDIX


http://www.stewart.ie/policy/