https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

Assessing the Extent of Application of Total Quality Management Principles and Philosophy in the Construction Project Sub Sector

Isaac Kofi Yornu (PhD) | David Ackah (PhD)
Accra Technical University | African University College of Communication
Email: ikyornu@apoly.edu.gh | drackah@ipmp.edu.gh

Abstract

Taking into consideration the numerous challenges in the Ghanaian construction industry amidst numerous interventions of successive governments to address these issues. Most construction projects in the country get abandoned and unaccounted for across the nation. This research aimed at analysing the impact of project misalignment with business objectives on the overall project performance in the Greater Accra construction sub-region of Ghana using the Total Quality Management Model. The research delved into the causes of project misalignment, impact on business objectives and project performance, and the nature of the Ghanaian construction industry.

The study adopted a purposive sampling technique to sample 120 respondents/stakeholders including clients, professional consultants and contractors in the Greater Accra region. The results of the research showed that lack of communication, poor collaboration and process non-compliance are notable factors that influence misalignment of construction projects in the country. The findings revealed that construction firms that implement Total Quality Management emphasize on management leadership, work environment and culture, and supplier quality management compared to other management principles. Finally, the study shows that the level of implementation of Total Quality Management is low and there is no regulatory authority to monitor the performance of stakeholders in the construction industry.

Keywords: Project Misalignment, Project Performance, Project Appraisal, & Project Analysis

1.0 INTRODUCTION

The intention is to review as much as possible foundational knowledge based on research conducted by others in related fields. This article examines the relevant topics of interest to the study from existing academic sources and recognize where they fit in the entire field of study. This is in an attempt to help provide a foundation for research questions and support testing of the researcher's hypotheses using data acquired through a survey of experienced project management practitioners in the segmented area consisting of construction sector of the Ghanaian economy. Task Group 29 (1998), defined construction industry development as a deliberate and managed process to improve the capacity and effectiveness of the construction industry to meet the national economic demand for building and civil engineering products, and to support sustained national economic and social development objectives. The construction industry plays an essential role in the socio-economic development of a country. The activities of the industry have a lot of significance to the achievement of national socio-economic development goals of providing infrastructure, sanctuary and employment. It includes hospitals, schools, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewerage, drainage); highways, roads, ports, railways, airports; power systems; irrigation and agriculture systems; telecommunications etc.

The construction sector holds immense potential for stimulating growth, boosting project exports and generating employment. The domestic construction sector happens to be one of the fastest growing sectors, with an impressive average growth of 7-8 percent per annum. The foundation of a higher growth rate rests on a sound and efficient infrastructural development, which makes the construction sector a key sector. The rapid expansion of infrastructure by both government and the private sector has triggered off construction activities and fueled demand in many key sectors like cement, steel, paints and chemicals, glass, timber and earth moving equipment and machinery. The construction sector is a crucial industry having strong backward and forward growth linkages. The construction industry deals with all economic activities directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature. Besides, the construction industry generates substantial

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

employment and provides a growth impetus to other sectors through backward and forward linkages (Osei, 2013). The main purpose of this study is to analyse the impact of project misalignment with business objectives on the overall project performance in the Greater Accra construction sub-region of Ghana using TQM model.

2.0 BACKGROUND OF STUDY

Construction is one of the subject areas that is a bit difficult to give an apt definition. Carrying out maintenance or upkeep on a building is construction work. Repairing a farm building is construction work. Fitting mobile telecommunications equipment to the side of a structure is construction work. Clearly, the building of a new office block or housing estate is construction. Building a new road infrastructure is also construction. Construction work can involve building of new structures, which may include activities involved with subdividing land for sale as building sites or preparation of sites for new construction. Construction work also includes renovations involving additions, alterations, or maintenance and repair of buildings or engineering projects such as highways or utility systems. (Behm, 2008).

Construction is a high-risk activity, which must be managed from procurement, through the design process and to the end of the construction stage. Everyone involved in a building project must appreciate their role, from client, project supervisor design process (PSDP), designer, project supervisor construction stage (PSCS), contractor and employees. The construction industry in Ghana is aware of the many challenges facing the country and the industry in particular. The industry, in collaboration with government, academia and the public sector, is working towards a process that will both meet their own business interests while simultaneously protecting the environment. The issue is less one of awareness of the challenges than of formulating a strategy to move towards sustainability in the industry. The challenges are complex, involving a multitude of causes, impacts and diverse stakeholders, all with their own vision of what 'successful' development can and should look like. In short, the industry is searching for a vision of a sustainable future, and a process to arrive there (Ahmed et al., 2014).

Against a backdrop of population growth, migration and urbanization, Ghana faces many development challenges, including sporadic economic growth, environmental degradation, and overwhelming and complex social issues (Chikweche and Fletcher, 2014). Though economic growth has historically lagged the rest of the world, the continent has averaged 4.5% growth in GDP per year since 2000 (Oxford Economics 2012, 3). Oxford Economics forecasts that between now and 2030, GDP growth will exceed every other region of the world (Oxford Economics 2012, 3). There is a close relationship between economic growth and the construction industry, characterized by the physical infrastructure and asset-based development upon which growth and development are achieved (Songwe 2014, 18).

Nevertheless, there exist myriad challenges facing the construction industry in Ghana today. Increasingly, insurmountable social, environmental, health and economic challenges continue to hinder the growth of Ghana's construction industry. An inconsistent electrical grid, overburdened public water distribution system, poor public sanitation, overcrowded living conditions and failing infrastructure make both the industry's future success and present state difficult to sustain. If not addressed soon, further 'upstream' problems, such as dependence on fossil fuels, overburdened hydroelectric power for energy, rapid deforestation of timber, toxification of ground water, and unregulated 'horizontal' growth resulting in urban sprawl will have long-term detrimental impacts on Ghana's future (Ahmed et al., 2014).

The construction industry in Ghana is aware of the many challenges facing the country and the industry in particular. The industry, in collaboration with government, academia and the public sector, is working towards a process that will both meet their own business interests while simultaneously protecting the environment. The issue is less one of awareness of the challenges than of formulating a strategy to move towards sustainability in the industry. The challenges are complex, involving a multitude of causes, impacts and diverse stakeholders, all with their own vision of what 'successful' development can and should look like. In short, the industry is searching for a vision of a sustainable future, and a process to arrive there. Kwaku Ahmed, Lamia Hatira and Paul Valva, 2014 (The Construction Industry in Ghana, West Africa "How can the construction industry in Ghana become sustainable?)

Against a backdrop of population growth, migration and urbanisation, Ghana faces many development challenges, including sporadic economic growth (Chikweche and Fletcher 2014, 1),

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

environmental degradation, and overwhelming and complex social issues. Though economic growth has historically lagged the rest of the world, the continent has averaged 4.5% growth in GDP per year since 2000 (Oxford Economics 2012, 3). Oxford Economics forecasts that between now and 2030, GDP growth will exceed every other region of the world (Oxford Economics 2012, 3). There is a close relationship between economic growth and the construction industry, characterized by the physical infrastructure and asset-based development upon which growth and development are achieved (Songwe 2014, 18).

Nevertheless, there exist myriad challenges facing the construction industry in Ghana today. Increasingly, insurmountable social, environmental, health and economic challenges continue to hinder the growth of Ghana's construction industry. An inconsistent electrical grid, overburdened public water distribution system, poor public sanitation, overcrowded living conditions and failing infrastructure make both the industry's future success and present state difficult to sustain. If not addressed soon, further 'upstream' problems, such as dependence on fossil fuels, overburdened hydroelectric power for energy, rapid deforestation of timber, toxification of ground water, and unregulated 'horizontal' growth resulting in urban sprawl will have long term detrimental impacts on Ghana's future. Kwaku Ahmed, Lamia Hatira and Paul Valva, 2014 (The Construction Industry in Ghana, West Africa "How can the construction industry in Ghana become sustainable?)

The characteristics of the industry have often been observed and criticized, and in by some it was even questioned whether construction is actually an industry. (Groák, S. (1994). "Is construction an industry? Note towards a greater analytical emphasis on external linkages." Construction Management and Economics 12, 287-293), or rather a "loosely coupled system" of projects Dubois, A. and Gadde, L.E. (2002). "The construction industry as a loosely coupled system: implications for productivity and innovation." Construction Management and Economics 20, 621-631. Construction projects have been described as coalitions of firms; a 'number of independent firms coming together for the purpose of undertaking a single construction project and that coalition of firms having to work as if it were a single firm, for the purposes of the project' Winch, G.M. (1989). "The construction firm and the construction project: a transaction cost approach." Construction Management and Economics 7, 331-345. Alternatively, the parties involved in construction projects have been interpreted as organizational units joining and operating together as a single production organization when it is advantageous; a temporary multiple organization; or a "quasi-firm" Eccles, R.G. et al (1981).

3.0 LITERATURE REVIEW

This aspect of the article focuses on review of relevant literature relating to the subject of analysing the impact of project misalignment with business objectives on the overall project performance in the Greater Accra Construction Sub-region of Ghana using the Total Quality Management (TQM) Model. Since the subject of construction is broad, the focus of this research shall be on construction of housing in the Greater Accra Region of Ghana. The intention is to review as much as possible foundational knowledge based on research conducted by others in related fields. This chapter examines the relevant topics of interest to this research study from existing academic sources and recognise where they fit in the entire field of study. This is in an attempt to help provide a foundation for research questions and support testing of the researcher's hypotheses using data acquired through a survey of experienced project management practitioners in the segmented area consisting of construction sector of the Ghanaian economy.

Task Group 29 (1998), defined construction industry development as a deliberate and managed process to improve the capacity and effectiveness of the construction industry to meet the national economic demand for building and civil engineering products, and to support sustained national economic and social development objectives. The construction industry plays an essential role in the socio-economic development of a country. The activities of the industry have a lot of significance to the achievement of national socio-economic development goals of providing infrastructure, sanctuary and employment. It includes hospitals, schools, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewerage, drainage); highways, roads, ports, railways, airports; power systems; irrigation and agriculture systems; telecommunications etc. The construction sector holds immense potential for stimulating growth, boosting project exports and generating employment. The domestic construction sector happens to be one of the fastest growing sectors, with an impressive

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

average growth of 7-8 percent per annum. The foundation of a higher growth rate rests on a sound and efficient infrastructural development, which makes the construction sector a key sector.

The rapid expansion of infrastructure by both government and the private sector has triggered off construction activities and fuelled demand in many key sectors like cement, steel, paints and chemicals, glass, timber and earth moving equipment and machinery. The construction sector is a crucial industry having strong backward and forward growth linkages. The construction industry deals with all economic activities directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature. Besides, the construction industry generates substantial employment and provides a growth impetus to other sectors through backward and forward linkages (Osei, 2013). The main purpose of this study is to analyse the impact of project misalignment with business objectives on the overall project performance in the Greater Accra construction sub-region of Ghana using TQM model.

3.1 Coverage of Construction

Construction in any country is a complex sector of the economy, which involves a broad range of stakeholders and has wide-ranging linkages with other areas of activity such as manufacturing and the use of materials, energy, finance, labour and equipment (Hillebrandt, 1985). The contribution of construction industry in the aggregate economy of a country has been addressed by a number of researchers and valuable literature available on the linkage between construction sector and other sectors of the economy. Several researchers conclude that the construction sector has strong linkages with other sectors of the national economy.

Hirschman (1958) first defined the concept of 'linkage' in his work on "Strategy of Economic Development". He emphasized the significance of 'unbalanced' growth among supporting sectors of the economy as opposed to a balanced development of all interrelated economic activities (Lean, 2001). Park (1989) has confirmed that the construction industry generates one of the highest multiplier effects through its extensive backward and forward linkages with other sectors of the economy. It is stated that the importance of the construction industry stems from its strong linkages with other sectors of the economy (World Bank, 1984). However, interdependence between the construction sector and other economic sectors is not static (Bon, 1988; Bon, 1992). Strout (1958) provided a comparative inter-sectoral analysis of employment effects with an emphasis on the construction. Ball (1981) and Ball (1996 and 1995) addressed the employment effects of the construction sector as a whole. Many studies (Fox, 1976; Bon and Pietroforte, 1993) use the strong direct and total linkage indicator to explain the leading role of the construction sector in the national economy.

Field and Ofori (1988) stated that construction makes a noticeable contribution to the economic output of a country; it generates employment and incomes for the people and therefore the effects of changes in the construction industry on the economy occur at all levels and in virtually all aspects of life (Chen, 1998; Rameezdeen, 2006). This implies that construction has a strong linkage with many economic activities (Bon, 1988; Bon and Pietroforte, 1993; Bon et al., 1999; Lean, 2001; Rameezdeen, 2006), and whatever happens to the industry will influence other industries either directly or indirectly and ultimately, the wealth of a country. Hence, the construction industry is regarded as an essential and highly visible contributor to the process of growth (Field and Ofori, 1988).

The significant role of the construction industry in the national economy was highlighted by Turin (1969). Based on cross section of data from a large number of countries at various levels of development, Turin (1969) argued that there is a positive relationship between construction output and economic growth. Furthermore, as economies grow construction output grows at a faster rate, assuming a higher proportion of GDP (Turin, 1969, Hua, 1995, Wells, 1986). In a recent article, Drewer (1997) returns to the 'construction and development' debate. Using data for 1990 similar to that assembled by Turin for 1970, he shows that global construction output has become increasingly concentrated in the developed market economies. He goes on to argue that this new evidence does not support Turin's propositions (Drewer, 1997, Wells, 1986).

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

3.2 The Country Ghana and Construction

As a developing country located in West Africa, with a land area of 238,537 square kilometres, and a population of over 27 million people, Ghana has great potential in the construction sector. Ghana through seeking to be the gateway to West Africa and the champion of African excellence, its construction industry has been growing steadily over the years. Given the Ghanaian Government's objective in the Ghana Poverty Reduction Strategy (GPRS II) to promote urban infrastructure development and the provision of basic services including increased access to safe, decent and affordable shelter has given the industry a further boost.

According to the World Bank (2003) report, the annual value of public procurement for goods, works and consultant services represents about 10 per cent of Ghana's gross domestic product (GDP). According to Ayirebi-Dansoh (2005), in Ghana, the operating environment for construction firms is constantly changing in the face of a volatile economic environment, shifting political climate and a highly competitive market. Despite the turbulent environment in which the industry operates, other studies have linked the relationship between the construction industry and the nation economy (Rameezdeen and Ramachandra, 2008). The construction industry according to Ayirebi-Dansoh (2005) is linked directly to the Ghanaian economy since the government is the biggest client in the industry. As a result, successive governments have been channeling many funds into the construction industry.

International donor agencies have also been helping through provision of funding. The construction industry in Ghana, as in other parts of the world, is huge and a crucial segment in economic development. No matter what one does, there is construction, as it cuts across all sectors. Being among the top drivers of the Ghanaian economy, including agriculture, manufacturing and mining, its importance cannot be over-emphasized, especially as the country is one of the most active economically in West Africa. The construction industry adds to growth as it employs both skilled and unskilled labour, from engineers and consultants to artisans and labourers. Construction and maintenance of buildings, housing, roads, bridges and other physical infrastructure are crucial to generate employment, development and growth. In Ghana, local contractors are ill-equipped, lack the necessary qualifications and finances and have been beaten by foreign contractors who have won the major construction works such as roads, bridges, and other infrastructure.

From a low point in the 1970s and 1980s, the share of construction in the GDP has moved up from 4.5% in 1975 to 8.5% by the turn of the century and has been doing about the same levels since. The sector grew by 10% in 2008 but registered a negative growth rate of 1% in 2009 due to the global economic recession. Most of the challenges faced by the poor in the country is associated with housing. This is because the housing environment represents an everyday-landscape, which can either support or limit the physical, mental, and social well-being of the residents (Bonnefoy 2007; Songsore and McGranahan 1993). The view, according to Newman (2008) is that adequate housing gives socio-economic benefits to both the occupants and the larger society (Newman 2008).

Rapid increase in population in Ghana has resulted in a large housing deficit, especially in urban areas. It is estimated that the country needs at least 100,000 housing units annually while supply is estimated at 35 percent of the total need. Other studies put the country's overall annual deficits between 70,000 and 120,000 housing units with only 30-35 percent of the annual estimated requirement being supplied (ISSER 2013). While there may be disagreements as to the estimate of the annual requirement, there is a consensus of a shortfall in the supply of housing, particularly in urban Ghana.

3.3 Project Management and Related Knowledge Areas

A project, according to Newton (2015) is a temporary endevour designed to produce a unique product, service or result with a defined beginning and end (usually time-constrained, and often constrained by funding or deliverables), undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. There are some characteristics that are peculiar to most projects: they have a specific start and endpoint, and once that endpoint is reached, the project is over. All projects are unique in the sense that there may not be a pre-existing blueprint for the projects execution or the need to repeat the project once it is completed.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

The goal characteristic of a project may be well perceive as achieving stated objectives or solve a specific problem, while its temporary nature signifies a discreet, definable commencement and conclusion (Olateju et al, 2011). Project management on the other hand is regarded as a system or process of planning, designing, scheduling, managing and controlling interconnected project activities in order to achieve specific objectives or goal within a specific time, budget and standards (Lewis, 2007). Abbasi and Al-Mharmah (2000) defined project management as the art and science of planning, designing and managing work throughout all the phases of the project life cycle. The primary challenge of project management according to Newton (2015) is to achieve all of the project goals and objectives while keeping in mind the constraints on scope, time, quality and cost.

3.4 Focus on Stakeholder Analysis

Project management helps an organization to invest their limited or scarce resources in the most efficient way in order to achieve recurring success and meeting the expectations of stakeholders. "Stakeholders are those persons or organizations whose views, interests, and/or requirements can impact on, or are impacted by, the initiation and/or formulation and eventual implementation of the project solution" (Kagioglou et al, 1998). In the construction industry, stakeholders are numerous and can include both "traditional" and emerging stakeholders (Elkington, 1997). These stakeholders may include the client and shareholders, financiers, insurers, consultants, contractors, sub-contractors and suppliers, various levels of government policy makers and regulators and the end-users.

The emerging stakeholders according to Sidwell et al, (2001) include special interest groups, employees and unions, competitors and the end-users' customers. Governments and other institutions usually undertake different projects with the goal of creating new service or improving the technical efficiency of an existing project (Olateju et al, 2011). According to the Association of Project Management (APM, 2013), a project is deemed successful when it meets the expectations of its stakeholders. The industry's customers and stakeholders seek timely and efficient completion of building and construction projects, preferably in a non-confrontational environment, and the outcomes depend largely on the cooperative attitudes of the parties involved (Sidwell et al, 2001).

3.5 Project Misalignment

A typical construction project brings together individuals representing a wide variety of functional groups with diverse priorities, expectations and requirements. According to Eggleton (2001), the 'business as usual' attitudes of clients and contractors is project misalignment. A project misalignment is occurring when the real requirements of the company are not satisfied or when the company's business processes are badly supported by the customized system (Mamoghill et al, 2011). The requirements of a company are associated with business processes to be put under control, and take place at three different levels including organizational level, informational level and functional level. The objectives of an organization are not satisfied when: (1) the implemented business processes do not correspond to the wished one, either for the sequencing of the activities or about people who are involved in the activities (organizational and functional levels), and also at the level of data used or impacted by the processes (informational level). (2) the degree of integration, that is how the processes have been put under control, is not reached. Project misalignment also occurs when a company fails in expressing its accurate requirements (Mamoghill et al, 2011). A project misalignment if not effectively managed can affect the company's performance and even leads to its bankruptcy. In a report by Davenport (1998), some well-known companies went bankrupt and the problem was associated with bad management of the project alignment.

3.6 Total Quality Management (TQM)

Quality applies not just to the products and services provided but also to the people and processes that provide them and the environments in which they are provided (Goetsch and Davis 2006: 5). Once a Quality Management System (QMS) is in place, firms should implement a total quality management (TQM) system that is aimed at changing a company's culture, since TQM offers a plan to manage and improve the quality system continuously (Abdul-Rahman 2008: 8).

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

Simply, TQM is the art of managing the whole system to achieve excellence (Besterfield et al. 1995: 1), and a TQM organisation is one that has the capacity to change itself to adapt to the environment it operates (Mead and Andrews 2009: 263). Implementation of TQM involves a change of culture (Pun 2001) and a strategic planning process of commitment to change (Stupak and Leitner 2008: 15). TQM is a set of systematic activities carried out by the entire organization for the purpose of effectively and efficiently achieving the organization's objectives so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price (Deming Prize Committee 2012: 2). It then follows that the degree of involvement of the total organization serves as the key difference between TQM and ISO 9000 (Goetsch and Davis 2012: 237). Nevertheless, ISO 9000 is compatible with and can be viewed as TQM since the two are not in competition as expounded in the detailed review carried out by Goetsch and Davis (2012: 236–239).

3.6.1 Quality in Construction

Quality can be defined as meeting the legal, aesthetic and functional requirements of a project. Requirements may be simple or complex, or they may be stated in terms of the result required or as a detailed description of what is to be done. However, quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements. Law defines quality in terms of professional liability, a legal concept that requires all professionals to know their trade and practice it responsibly. Every architect and engineer who offers his or her expertise to owners is subject to professional liability laws. Some design-professionals believe that quality is measured by the aesthetics of the facilities they design. According to Stasiowski and Burstein, this traditional definition of quality is based on such issues as how well a building blends into its surroundings, a building's psychological impacts on its inhabitants, the ability of a landscaping design to match the theme of adjacent structures, and the use of bold new design concepts that capture people's imaginations.

Because aesthetic definitions of quality are largely subjective, major disagreements arise as to whether quality has been achieved or not. Since objective definitions of aesthetic quality do not exist, design professionals generally take it upon themselves to define the aesthetic quality of their designs. Quality can also be defined from the viewpoint of function, by how closely the project conforms to its requirements. Using this definition, a high-quality project can be described by such terms as ease in understanding drawings, level of conflict in drawings and specifications, economics of construction, ease of operation, ease of maintenance, and energy efficiency. In the construction industry, quality can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner. According to an ASCE study, quality can be characterised as follows:

- Meeting the requirements of the owner as to functional adequacy; completion on time and within budget; life- cycle costs; and operation and maintenance.
- Meeting the requirements of the design professional as to provision of well-defined scope of work; budget to assemble and use a qualified, trained and experienced staff; budget to obtain adequate field information prior to design; provisions for timely decisions by owner and design professional; and contract to perform necessary work at a fair fee with adequate time allowance.
- Meeting the requirements of the constructor as to provision of contract plans, specifications, and other documents prepared in sufficient detail to permit the constructor to prepare priced proposal or competitive bid. It also involves timely decisions by the owner and design professional on authorization and processing of change orders; fair and timely interpretation of contract requirements from field design and inspection staff; and contract for performance of work on a reasonable schedule which permits a reasonable profit.
- Meeting the requirements of regulatory agencies as to public safety and health; environmental considerations; protection of public property including utilities; and conformance with applicable laws, regulations, codes and policies.

In addition, one should differentiate between 'quality in fact' and 'quality in perception'. The providers of services or goods that meet specifications achieve quality in fact. A service or product that meets the customer's expectations achieves quality in perception. In other words, a product can be of high quality

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

and yet it may not meet customer's needs and vice versa. An example of not meeting customer needs is the prefabricated high-rise apartment buildings that were built in the 1970s using innovative technology in low-cost building processes. The buildings had to be pulled down in the late 1980s because no one wanted to live in these apartments despite the low rents. The buildings failed to meet the tenants' expectations of comfort, aesthetics and function. One should also differentiate between 'product quality', i.e. the quality of elements directly related to the physical product itself, and 'process quality', i.e. the quality of the process that causes the product to be either acceptable or not. For example, 'product quality' in the construction industry may refer to achieving quality in the materials, equipment and technology that go into the building of a structure, whereas 'process quality' may refer to achieving quality in the way the project is organized and managed in the three phases of planning and design, construction, and operation and maintenance.

3.6.2 Quality Assurance/Quality Control

According to the Manual of Professional Practice for Quality in the Constructed Project, "Quality. Assurance (QA) is a program covering activities necessary to provide quality in the work to meet the project requirements. QA involves establishing project related policies, procedures, standards, training, guidelines, and system necessary to produce quality The design professional and constructor are responsible for developing an appropriate program for each project. QA provides protection against quality problems through early warnings of trouble ahead. Such early warnings play an important role in the prevention of both internal and external problems". On the other hand, Quality Control (QC) is the specific implementation of the QA program and related activities. Effective QC reduces the possibility of changes, mistakes and omissions, which in turn result in fewer conflicts and disputes. As mentioned earlier, quality in construction is too important to be left to chance. A look at history gives some insight into the problem. Through the first half of this century, engineers and architects were in total control during the design phase. During the construction phase, they carried out a role described as 'supervision', ensuring that the owner received his money's worth in terms of quality. In the 1950s and 1960s, owners became increasingly concerned with cost and schedule, areas where design professionals were not providing good control.

The emphasis continued to be on quality and control of exposure to liability. At about the same time, the widespread use in the public sector and, to a large degree, in the private sector, of the sealed competitive bid gave the owner the advantage of competitive pricing, but also forced the general contractor to look for every advantage during construction to control cost and maintain a profitable stance. As mechanical and electrical systems became more complex, the general contractor turned responsibility for such work over to subcontractors, including quality control of their workmanship. Through contract, subcontract and sub-subcontract, the general contractor ended up delegating responsibility for quality. In the 1980s came the advent of the Construction Management Project Delivery System whereby construction management firms emerged as entities not responsible for design and/or construction, but performing only managerial functions on behalf of the owner from the inception phase to the completion of the construction phase. Construction management firms now performed inspection and quality control that had traditionally been performed by architects and engineers.

According to O'Brien, one way in which more attention will be given to quality control is development of a project quality control plan. Presently, testing and inspection requirements are scattered throughout the contract specifications. To develop a firm plan, the testing and inspection requirements can be combined into a new division of the specifications. This would emphasize quality control and provide an organized location in which all quality control issues are identified to the bidders. As a part of a quality control plan, the manner in which the construction manager will apply quality control procedures should be described to the bidders. This will permit them to assign appropriate costs to the testing procedures.

3.6.3 Factors that Affect Quality

Establishing the project requirements for quality begins at project inception. A careful balance between the owner's requirements of the project costs and schedule, desired operating characteristics, materials of construction, etc. and the design professional's need for adequate time and budget to meet

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

those requirements during the design process is essential. Owners balance their requirements against economic considerations and, in some cases, against chance of failure. The design professional is obligated to protect public health and safety in the context of the final completed project. The constructor is responsible for the means, methods, techniques, sequences, and procedures of construction, as well as safety precautions and programs during the construction process. Project requirements are the key factors that define quality in the process of construction.

The process of construction can be broken down into three main phases, namely: the planning and design phase, the construction phase, and the maintenance and operation phase. The Figure 2 below shows generally accepted elements of TQM and construction industry-specific factors that affect quality of the process of a building project. The factors that affect quality in each phase of the construction process have been identified through a literature review and are discussed in the following sections.

3.6.4 Management Commitment and Leadership

A study on the cost effectiveness of the construction industry by the Business Roundtable concluded that the primary causes for the decline of construction productivity directly or indirectly involves poor management practices. Since quality is part of productivity, the first step for management is to recognize that there is a problem. The success of a TQM program first depends on management practices. TQM is a culture and philosophy that must permeate an organization as the method of management. It can thrive only under a senior management that establishes TQM as a top priority. This commitment must be coupled with a thorough understanding of TQM. Only if supported by this commitment and understanding, can senior management lead the company toward the realization of higher quality in its undertakings. The prominent method of management practiced in the United States today, including the construction industry, is management by control, not by participation. Forced by international competitive pressures and increasing demands for quality products and services, industries are re-evaluating the effectiveness of management by control.

According to Joiner and Scholtes, in this style of management, the emphasis is on the organizational chart and the key control points within the structure. All managers, beginning at the top, are given certain goals for the next year. They, in turn, set goals and impose controls on each of their subordinates. In construction terms, cost, schedule, and possibly quality goals are established for each project. Project managers are rewarded based on meeting these goals. This method has been somewhat successful. It is simple, logical, and consistent. However, there are problems when the work is displaced by the controls themselves. In addition, competition to meet short-term goals can lead to internal conflict, adversarial relationships, reduced communication, and accusations when goals are not achieved, and even fabricated reports of conformity.

Management by control encourages an organization to look inward rather than outward to the customer and the customer's needs. Once it acknowledges that there is a problem, the second step for management is to develop a clear understanding of the underlying principles and elements of TQM. Management then demonstrates its commitment to quality through action. Without this understanding, management's action will most likely contradict TQM, confirming the doubts of the labour force and dooming the effort to failure. A survey conducted by Gunaydin (1997), to investigate TQM in the design, construction, and operation phases of projects undertaken in the USA, indicated that the level of management commitment to continuous quality improvement is rated as one of the most important factors that affect the quality of the constructed facility.

3.6.5 Training

Every quality expert recognizes the importance of training. Under TQM, quality becomes everyone's responsibility and the training must be targeted for every level of the company. There should be customized training plans for management, engineers, technicians, home and field office staff, support personnel and field labour. It can be argued that the transient construction work force is quite different from the relatively stable manufacturing work force. This transient nature may make it more difficult to train workers, particularly craft labour, for the construction industry. However, many aspects such as training and awareness are similar between the safety consciousness of construction firms and the implementation of TQM concepts. Many US construction companies that had safety forced upon them with

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

the formation of the Occupational Safety and Health Administration have proven the cost effectiveness of their safety programs and now use their safety records as a marketing tool. Some of the same techniques used to instil a safety awareness in craft labour may be adaptable to instil a similar quality awareness. It is easy to envision using a good quality performance record as a strong marketing tool.

If TQM concepts become widely accepted throughout the construction industry, workers switching from one company to another should require less TQM training since all workers would have received basic quality awareness in their previous employment. The training effort may include instruction in the basics of TQM, cause-and-effect analysis, team problem solving, interpersonal communication and interaction, rudimentary statistical methods and cost of quality measurement. A study of TQM in more than 200 companies found that skills in human interaction, leadership, and initiative are instrumental to the success of any quality improvement effort. The demands on these interpersonal skills increase as the complexity and sophistication of the technical systems increase. The training effort follows a specific plan, and its implementation and effectiveness are carefully tracked. It is initiated in a limited number of pilot teams. The success stories of the pilot teams are then used to fuel the remaining training effort. Follow-up training is essential, and is part of the overall training plan and a job requirement for each individual. The training of employees in the design phase was found to be not very important, in the construction phase moderately important, and in the operation phase very important by the respondents in Gunaydin's study of TQM in US construction projects. It follows that operation and maintenance crews working in constructed facilities should be the main recipient of training efforts. Findings are parallel to ISO 9001, which emphasizes the importance of training and underlines those activities demanding acquired skills should be identified and the necessary training provided.

3.6.6 Teamwork

Quality teams provide companies with the structured environment necessary for successfully implementing and continuously applying the TQM process. Quality training is conducted and the continuous improvement process executed through a well-planned team structure. The ultimate goal of the team approach is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the TQM process. At the industry level, extending the TQM concept to the parties mentioned above in the form of joint teams achieves higher customer satisfaction. These joint teams are responsible for establishing joint goals, plans, and controls. The teams provide a mechanism for listening to and communicating with the owner and for measuring the level of customer satisfaction. Two obstacles to establishing joint teams are the state of legal independence between companies and their traditional methods of working individually.

These obstacles can be overcome in the construction industry however, if the owner is dedicated to doing so. There are several case studies of successful partnering arrangements. For example, on a large refinery project, TQM was applied on a project team basis; representatives of the owner and the two major contractors on the project served on the project quality steering committee. While this is a new concept, early progress is encouraging.

At the company level, teams composed of department representatives are necessary to implement TQM throughout the organization. The same team approach can be used at the project level. "Extent of teamwork of parties participating in the design phase" was found to be the most important factor that affects quality in Gunaydin's study of TQM in US construction projects. In the same study, construction managers and designers ranked this factor as the most important factor. This result shows that teamwork among parties such as structural, electrical, environmental, civil engineers, architects, and owners is essential to reach the quality goals for design. In the construction phase, "extent of teamwork of parties participating in the construction process" was found to be very important and ranked 2nd by constructors and 4th by construction managers. It appears that the importance of teamwork in the design phase was relatively more pronounced than in the construction phase.

3.6.7 Statistical Methods

Statistical methods provide problem-solving tools to the TQM process. According to Perisco (1989), they provide teams with the tools to identify the causes of quality problems, to communicate in a precise language that can be understood by all team members, to verify, repeat, and reproduce

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

measurements based on data. It also helps to determine the past, present, and to a lesser degree, the future status of a work process, and to make decisions on facts that are based on data rather than the opinions and preferences of individuals or groups. The most commonly used statistical methods in the TQM process include histograms, cause and effect diagrams, check sheets, Pareto diagrams, graphs, control charts, and scatter diagrams. Statistical methods are very important for manufacturing industries in order to improve quality.

Oberlender (1993) under- lines the importance of statistical methods in order to provide essential problem-solving tools to the TQM process. The importance of statistical techniques is also underlined by ISO 9001. However, contrary to TQM philosophy, the use of statistical methods was found to be in Gunaydin's (1995) survey the least important factor that affects quality in the construction process and ranked at the very bottom of the importance lists in the design and construction phases by designers, constructors, and construction managers. It can be concluded that all the professionals involved in this study agree that the use of statistical methods has relatively very little effect on the quality of the construction project. This finding supports Hellard's (1994) contention that individual construction activities are typically unique and eliminate the potential for any kind of statistical process control.

3.6.8 Cost of quality

The cost of quality is considered by Crosby (1967) to be the primary tool for measuring quality. In his approach, it is used to track the effectiveness of the TQM process, select quality improvement projects, and provide cost justification to doubters. By bringing together these easily assembled costs of review, inspection, testing, scrap, and rework, one can convince management and others of the need for quality improvement." Cost of quality has received increasing attention in recent years. It is effective in its intended purpose of raising awareness about quality and communicating to management the benefits of TQM in terms of dollars. Quality costs consist of the cost of prevention, the cost of appraisal, and the cost of deviation. Prevention costs are those resulting from activities used to avoid deviations or errors, while appraisal costs consist of costs incurred from activities used to determine whether a product, process, or service conforms to established requirements. The cost of design or constructability reviews, as well as the cost of modifying work procedures to adhere to quality standards might be considered prevention costs, while inspection is an example of an appraisal cost. A survey of US firms indicates that the major obstacle to using the ISO 9000 standards is the additional cost of modifying work procedures and the additional cost of revising standards.

Deviation costs are those resulting from not meeting the requirements. Some deviation costs are incurred on the project site due to scrap, rework, failure analysis, re- inspection, supplier error, or price reduction due to non- conformity. Other deviation costs are incurred once the owner takes possession of the constructed facility. These include costs for adjustment of complaints, repair costs, costs for handling and replacing rejected material, workmanship or equipment costs for correcting errors, and litigation costs. In the construction industry, owners on a competitive basis select contractors. Even though the bid is considered the major criterion of selection, especially private owners also consider the contractors' safety record, technical support, equipment capabilities, and especially reputation regarding the quality of the work performed. Contractors with a reputation for poor quality are not likely to be awarded many projects in the existing competitive marketplace. It therefore pays contractors to invest in measures to achieve high work quality in order to increase chances of winning contracts.

3.6.9 Supplier Involvement

The ability to produce a quality product largely depends on the relationship among the parties involved in the process; the supplier, the processor, and the customer. The quality of any stage in a process is contingent upon the quality of the previous stages. The quality of the project built by the constructor is directly related to the quality of the plans and the specifications prepared by the designer, the quality of the equipment and materials supplied by the vendors, and the quality of work performed by the subcontractors. Close and long-term relationships with these suppliers to the construction process are required if the constructor is to achieve the best economy and quality.

Traditionally, in the construction industry, contractors, subcontractors, and vendors are all pitted against one another to compete based on low-bid contracts. Yet, the fourth of Deming's recommendations

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

for reaching a high level of quality stresses that companies must end the practice of awarding business on the basis of price tag alone.

According to Peters (1987), successful projects in the future are likely to be decided based on quality, life-cycle costs (not initial cost), and supplier responsiveness, which can only be achieved through partnership relationships; these relationships will involve fewer suppliers, and they are expected to be based on mutual trust. This is already being proven true in certain areas of the industrial construction market. Long-term partnering agreements have been formed between a number of owners and contractors. Some owners are requiring their contractors to have formal TQM programs, and both owners and contractors are requiring their vendors to implement TQM if they wish to be considered for future work.

3.6.10 Customer service

TQM is a process that requires universal involvement to be successful. This includes customer involvement. As more and more companies become involved in the TQM process and demands for improved quality increase, this concept becomes increasingly important. Customers may be either internal or external. Satisfying the needs of these customers is an essential part of the process of supplying the final external customer with a quality product. Juran (1998) claims that the parties in a process (supplier, processor, and customer) have a "triple role". The designer is the customer of the owner because the designer has to receive the project requirements from the owner in order to provide a feasible design. The designer supplies plans and specifications to the constructor; in this case, the constructor is the designer's customer because the constructor uses the designer's plans and specifications, then conducts the construction pro- cess, and finally supplies the completed building to the owner. The owner is now the constructor's customer. Quality in each phase is affected by the quality in the preceding phases. Therefore, customer service in each phase is important for the overall quality performance of the process.

3.6.11 Construction Industry-Specific Factors

While the evolution of quality control in the construction industry is parallel to that of the manufacturing industry, many dissimilar characteristics distinguish the two industries. The following differences, some of them significant, must be considered when applying a quality program to construction: Almost all construction projects are unique. They are single-order, single-production products. Unlike other industries, which usually have a fixed site with similar conditions for production, each construction production site always displays different conditions. The life-cycle of a construction project is much longer than the life-cycle of most manufactured products. There is no clear and uniform standard in evaluating overall construction quality as there is in manufactured items and materials; thus, construction projects usually are evaluated subjectively. Since construction projects are a single-order design project, the owner usually directly influences the production. The participants in the construction project--owner, designer, general contractor, subcontractor, material supplier, etc. - differ for each project.

Because of these distinguishing characteristics, the construction industry has generally been considered to be quite different from manufacturing industries. That is why, quality control procedures that work effectively in a mass production industry have not been considered suitable for the construction industry. Consequently, quality control throughout the construction industry has not evolved to the level attained in manufacturing industries. According to Asakaoru, project design and construction planning are carried out based upon a standard derived from relevant codes, owner requirements, and design company standard practice. Construction is then managed to conform to this composite standard as interpreted by the constructor. Quality assurance via owner, designer, or building authority, or a combination, occurs after completion, and in some cases, after partial compensation. This process results in the following trends:

- Quality is designed into and evaluated for each individual project each time. Except for some specialized areas of construction such as nuclear power plants and interstate road construction, there is no comprehensive quality policy employed to establish quality assurance for the entire industry or large segments of the industry.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

- No feedback system exists for re-examining quality control work. Correction only occurs when the owner, designer, or building authority points out defects in the project. This makes quality evaluation difficult.

- It is difficult to establish a data collection system to build an information base that could lead to early identification of defects. Since post-completion correction of unacceptable work is damaging to a company's or an individual's reputation, or both, the defect that occurs during construction is usually corrected or concealed before top level management or the owner discovers it. Thus, lack of information means no change in procedures, and allows the defect to reoccur during the next project.

- No mechanism exists for practical implementation of standards. This is not only because too many standards exist, but also because there are no efficient means for inputting new information and, thus, maintaining relevant standards.

- No system exists to manage quality throughout the design/construction process. While a 'construction management' block appears in Figure 4 below, it is only the execution of the construction plan, and does not contain a quality management component. According to Kubal, the concept of quality control should be changed from "controlling quality" to "control- ling management for quality".

This would result in using an integrated quality standard, based upon current industry- wide experience, to define policies and organization to manage quality. Policies are defined for the quality, for the control of quality, and for management of the quality control system. The organization created to implement quality control policies must have well-defined responsibilities and authority. In construction, failure can result from malfunction on the part of constructor, designer, or even owner. In most cases however, it is the result of a combination of actions by several or all of these parties. The quality management organization must have the ability to deal effectively with all parties involved. A quality flow chart (Figure 4) demonstrates the following characteristics for a properly organized quality control program in the construction industry. The quality standard is derived from a current database created through feedback from previous projects, providing a more uniform and comprehensive standard. Quality management in the planning and design, construction, and operation and maintenance phases are integrated through the construction management project delivery system. Defects are identified and corrected early. Feedback expands the quality database to eliminate repetition of the identified defects.

Quality of codes and standards According to the ASCE manual, the primary purpose of codes and standards is to protect the public's health and safety. Compliance with codes and standards should be an issue addressed early in the design phase. Without early identification of the appropriate codes and standards, re- working plans and specifications can result in considerable cost and delay. The design professional must be knowledgeable about the provisions of codes and standards before starting the design process because the building codes directly control the minimum standards of many components of a building project, and are responsible for much of the finished product quality. Kubal claims that regulations controlling the construction process are much more restrictive than in most manufacturing and service industries. Stasiowski and Burstein underline that quality design begins with sound engineering and scientific principles, must satisfy the criteria of applicable codes and standards, but also the owner's project requirements. Codes and standards refer to the minimum criteria. Owners, however, may have particular requirements. Gunaydin's survey of construction managers and US designers indicates that the effect of codes and standards on the quality of the operation is perceived as minimal.

Quality of drawings and specifications Drawings and specifications are the two sets of documents given to the constructor that provide technical information on materials, performance of the constructed facility, and quality requirements. Drawings are the only documents given to the constructor that show the design concept, size and scope of the job, number and size of materials or items, and how they are assembled into a final project. Oberlender also underlines that the final product of design work is a set of contract documents (drawings and specifications) to guide the physical construction of the project. There

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

are often inconsistencies between the drawings and specifications. That is why it is critical that drawings be clear, concise, and uniform. Indeed Gunaydin's findings indicate that the quality of the drawings and specifications received from the designer affect the quality in the design and construction phases, and consequently the quality of the constructed facility.

3.6.12 Constructability of Design

Constructability is one of the major factors that affect the quality of design. According to the ASCE manual, the design professional must consider the requirements of the constructor. The project must be constructible by those retained to build the project. Like codes, constructability and construction techniques vary in different geographical areas. Kubal indicates for example that in addition to general reviews of constructability, designs must also be reviewed for effectiveness and compatibility with local requirements, including both the initial construction and post construction operations. Both the initial design constructability and the completed operational design should be reviewed in the quality construction programs instituted by the design team members. In addition, design professionals must clearly and adequately communicate the design intent to the constructor. This is done initially with the contract documents, both plans and specifications. Quality design extends throughout the construction phase of the project.

Oberlender indicates that traditionally, engineering and construction have been separated early in the project. The adoption of new technology such as three-dimensional computer-aided drafting and design, robotics, and automation in construction has generated increased interest in the constructability of the project. With these innovations, designs can be configured to enable efficient construction, which places more emphasis on merging engineering and construction to include constructability's input in the design effort. The desired result is to facilitate the exchange of ideas between construction and design before and during design, rather than after design. According to the ASCE manual, the project design team should include engineers with field experience. Many organizations have these engineers on staff. However, it may be necessary in some cases to retain engineers with the necessary expertise, or form a joint venture with an appropriate concern.

3.7 Application of TQM in Construction

In his study, Anvuur et al (2006) concluded that the debilitating factors derailing the efforts in achieving value for money in the construction industry include deteriorating quality of construction force, poor health and safety measures Foster & Pushak (2011) stated that despite Ghana's success with increasing access to infrastructural services, the quality of service remains low. He explained that perhaps the most dramatic case is in the water sector, where exceptionally high losses of water produced, with little reaching end customers and exposed to intermittent supplies. Until this issue is resolved, Ghana's recent technical achievement of the Millennium Development Goal for water supply will remain a hollow victory. Power supply is also increasingly subject to reliability problems that stem from neglect of aging transmission and distribution assets. Even in mobile telephony, the increasing rate of dropped calls has become a concern. This overall pattern suggests that Ghana may benefit from a systematic framework for regulating the quality of public services (Foster & Pushak, 2011). Therefore, GCI must assess its quality requirements in order to make the industry attractive.

Quality definition is dynamic since the customers vary depending on their opinions. Some common definitions of quality are Conformance to Specifications, Fitness for use, Value for price paid. Tang et al, (2005) defined quality as a state that meets the legal, aesthetic and functional requirement of a product or project by customers. Proponents of Quality started with Quality Control (QC) that deals with the inspection of works. Later on, Quality Assurance (QA) that is about prevention of defects was introduced. Currently the standard for ensuring quality work is by the concept of Total Quality Management (TQM). In recent years, many of the management practices used to support construction organizations are being challenged (Hoonakker, 2010). Clients demand improved service quality, faster buildings and innovations in technology. The construction industry has turned to the manufacturing sector as a point of reference and source of innovation. Successful concepts derived from manufacturing industry, such as Total Quality Management (TQM), and Lean (or Just-in-Time) Production, are being adopted and integrated into the

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

construction industry. Total Quality Management is increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer (Kanji & Wong, 1998 as cited in Hoonakker, 2010). Harris and McCaffer (2001) explain that total quality management provides the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company.

The role of total quality management for a construction company is not an isolated activity, but the total involvement of all the operational and managerial processes of the company. According to Hoonakker (2010) most of the research concludes that it is necessary to transpose and translate the principles, practices and techniques used for TQM in manufacturing to construction. In line with this suggestion, TQM elements that past researchers have identified as applicable to the construction industry includes; top management commitment and leadership, human resource management, customer focus, planning. It also include process management, supplier management, continuous improvement, information analysis and evaluation, teamwork and quality culture (Arditi & Gunaydin, 1997; Low & Teo, 2004; Metri, 2004; Jha & Kumar, 2010; Gherbal et al., 2012; Imbeah, 2012).

3.8.1 Top Management Commitment and Leadership

According to Tannenbaum et al. (1961) cited in Gherbal et al. (2012) defined leadership as: "the interpersonal influence, exercised in a situation, and directed, through the communication process, toward the attainment of a specified goal or goals". In the construction industry, top management commitment/leadership is very crucial to the success of total quality management program of a construction organization (Arditi & Gunaydin, 1997; Low & Teo, 2004; Jha & Kumar, 2010; Gherbal et al., 2012). Management must provide policies for promoting client/customer satisfaction; actively communicate quality policies and plans to employees (internal and external) to create awareness, interest, desire and action. Management establishes clear mission, vision and plan statement regarding business objectives. Additionally, Management must as well provide the necessary resources and problem-oriented training to the employees to drive the TQM agenda (Juran & Gryna, 1993). Management must also actively lead and direct quality management programs and assume responsibility for evaluating and improving quality system at pre-defined intervals (Imbeah, 2012).

3.8.2 Human Resources Management

Human resource management involves how the workforce is enabled to develop and utilize their full potential with the company's objectives. According to Khan (2003), Management participation in quality activities alone is not enough to contribute to quality improvements, as cost of total quality is difficult to control by management alone. Employees are encouraged to show commitments to quality issues. When workers themselves are committed to delivering quality, they take greater initiative towards meeting product and process specifications; detecting and eliminating bottlenecks; improving product and process designs and setting realistic, yet challenging performance targets.

This is enhanced if resources are provided for employees for effective training and developmental activities. Training programs attempt to teach employees how to perform particular activities or a specific job. Education, on the other hand, is much more general, and attempts to provide employees with general knowledge that can be applied in many different settings (Rao et al., 1999). With TQM, quality becomes everyone's responsibility and the training must be targeted for every level of the company (Arditi & Gunaydin, 1997). Construction organisations should organise customised training plans or programs for management, engineers, technicians, home and field office staff, support personnel and field labour in line with quality objectives and goals of the organization (Arditi & Gunaydin, 1997). The training can be in a form of in-service, external experts on quality, seminars on quality improvement programs or TQM philosophy. In order to have effective learning activities, a firm should continually encourage employees to accept education and training.

According to Imbeah (2012) when education and training on TQM concepts become widely accepted throughout the construction industry, workers switching from one company to another should require less TQM training since all workers would have received basic quality awareness in their previous employment.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

Besides, training and education; employees must be empowered to make certain decisions on the job, to communicate with others in order to solve problems and to find their ways of doing work that will reduce wasted steps or improve quality (Eisman,1992). More so, employees must be recognized and properly motivated (i.e.: employees must be given incentives, bonuses and peaceful working environment).

3.8.3 Customer Focus

Customer focus can be defined as the degree to which a firm continuously satisfies customer needs (Gherbal et al., 2012). The key to the quality management is maintaining a closer relationship with the customer in order to fully determine the customer's need, so the customer should be closely involved in the product design and development with valuable input to every stage (Saylor 1996 as cited in Gherbal et al., 2012). The customer allows an organization to exist, for every organization, profit or non-profitable, partnerships, departments, functions, groups, or teams; therefore, customer focus is very critical in TQM. Impliedly, in construction industry, quality should be customer driven. Employers should be well aware of the concept of internal and external customers. They should care about meeting and exceeding the customer expectations. There must be a focus on customer feedback and accordingly the process should be driven.

According to Juran cited in Arditi & Gunaydin (1997), the parties in a process (Supplier, Processor, and customer) have a "triple role". This triple role concept is applicable to construction industry. Arditi & Gunaydin argued that in construction, the designer is the customer of the client because the designer has to receive the project requirements from the client in order to provide a feasible design. The designer supplies plans and specifications to the constructor; in this case, the constructor is the designer's customer because the constructor uses the designer's plans and specifications, then conducts the construction process, and finally supplies the completed project to the client. The client is now the constructor's customer. Quality in each phase is affected by the quality in the preceding phases. Therefore, customer service in each is essential for the overall quality performance of the process (Arditi & Gunaydin, 1997).

3.8.4 Strategic Planning

The strategic planning involves how the company sets strategic directions, how it determines key action plans, and translates them into an effective performance management system. Strategic planning incorporates the development and deployment of plans (Lee et al., 2003), improve relationships with customers, suppliers, and business partners (Prybutok et al., 2008) and helps in achieving long and short term goals through participative planning (Teh et al., 2009). Strategic Planning allows firms to set clear priorities and allocate resources for the most important things. It also provides specific instructions for approaching, executing, and evaluating the development of strategic concepts (Metri, 2004).

3.8.5 Process Management

Process management refers to combinations of machines, methods, materials, tools, and people employed in production (Jaafreh & Al-abedallat, 2012). TQM works on the belief that the overall quality of products can be enhanced by improving the quality of the processes related to their creation (Ahire et al., 1996). The objective of process management is to reduce process variation by building quality into the production process (Flynn et al., 1995; Anderson et al., 1994). This thus increases the quality of outputs as well as decreasing the costs such as rework costs and waste costs (Anderson et al., 1994; Flippini & Forza, 1998). The maintenance of process capability to meet production requirements is an important matter in process control and improvement (Feigenbaum, 1991; Juran & Gryna, 1993).

According to Metri (2004), process management focuses on managing the construction process so that it operates as expected, without breakdowns, shortage/missing materials, tools, etc. It is needed to reduce rework and waste due to wrong specification of processing parameters. This provides clarity of ownership and less reliance on inspection (Deming, 1986). He further indicated that in the context of construction, specific activities like planning the sequence of field tasks, analysis of layout, access, temporary facilities, innovative use of materials, innovative use of construction equipment and tools, and

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

the use of pre-assembly or prefabrication items are carried out. In addition, constructability is included in the contract document. Pre-work, demobilization, execution is a part of process management.

3.8.6 Supplier Management

The supplier quality is an important element of quality management in construction organization because materials purchased are a major source of quality problems (Kaynak, 2003; Metri, 2004). Supplier quality management includes fewer dependable subcontractors, reliance on supplier's process control, strong inter dependence of supplier and customer, purchasing policy, emphasizing quality rather than price (Feigenbaum, 1991; Deming, 1986 in Salter, 1997), supplier quality control and supplier assistance in quality development. Materials are often a major source of quality problems and affect buyer satisfaction. According to Metri (2004) instead of relying on tools such as acceptance sampling to establish the quality of incoming materials and component parts, it is preferable for constructors to purchase from a more limited number of qualified or certified suppliers.

3.8.7 Continuous Improvement

Continuous improvement is the means for searching for never-ending improvements and developing processes to find new or improved methods in the process of converting inputs into useful outputs (Sadikoglu & Zehir, 2010). It helps in reducing the process variability thereby continuously improving the output performance. It is also the continuous reviewing and improving business processes, ensuring that customer requirements and statutory and regulatory requirements are met, maintained and exceeded if possible. In construction, continuous improvement involves tracking cost of quality process (rework, waste, rejects) for continuous improvement, ensuring that design and construction use quality tools (check sheet) for improvement activities, practicing continual review on the construction safety, work plans and workplace environment with a view for improvement. It encourages quality improvement discussions at subcontractor site meetings, practicing continual review of process completion time with a view of improvement, benchmarking process in order to improve activities in the firm with subsequent improvement to delight customers (Black & Porter, 1996; Imbeah, 2012).

3.8.8 Teamwork

Teamwork refers to an increase in employees' control over their work and allowing them to work as a group (Ooi et al., 2007). It is widely accepted working in a team or group is generally more effective than working individually (Zairi et al., 2005 as cited in Gherbal et al., 2012). This practice provides an atmosphere of mutual relationship, involvement, and participation in the organization. The eventual aim of the team approach in construction project is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the TQM process. Teamwork is necessary to encourage competitive activities internally among employees and externally with respect to suppliers and customers. According to Arditi and Gunayadin (1997), teamwork among construction parties such as structural, electrical, environmental, civil engineers, architects, and owners is essential to reach the quality goals for design and construction. Many authors acknowledge that teamwork is a critical element of TQM (Jha & Kumar, 2010; Gherbal et al., 2012; Imbeah, 2012). Employees must demonstrate cooperative behaviour and positive attitude towards working in a team.

3.8.9 Information Analysis and Evaluation

According to Jha and Kumar (2010) information analysis and evaluation is the critical enabler of TQM. This factor emphasizes that the key processes are measured and quantified regularly. According to Metri (2004), information analysis and evaluation in construction involve evaluation for various policies and strategies, quality audit, analysis of quality costs, department/function performance evaluation, and employee and supplier performance evaluation. He further indicated that if there were inferior dissemination of the generated information, quality techniques such as benchmarking would be rendered ineffective. To maintain a true customer focus, an organization must ensure prompt feedback of customer survey results to appropriate functional areas for effective actions.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

3.8.10 Quality Culture

According to Gherbal et al. (2012), culture within organization is defined by Hofstede (2001), as "all the interaction that takes place between employees within an organization along with the relationships engendered by this behaviour". Within the TQM culture, a co-operative and open culture has to be created by the organization management in which all the employees have to be made to feel that all of them are responsible for satisfying the organization's customers. They are going to feel and consider this only if they are involved in the development of the vision, plans and strategies of the organization. It is crucial for the organization to achieve a successful implementation of TQM to encourage the employees to participate in all these activities. The work culture must be very conducive. There should be an active interaction amongst the peers and support from supervisors.

The critical importance of the employee's involvement in the quality process of an organization should be based on the belief that the best process innovation idea comes from the people actually doing the job (Jha& Kumar, 2010). Gherbal et al. (2012) however, opined that employee are unlikely to behave in an acceptable responsible way in the case where they see the management behaving irresponsibly and saying something or acting in opposition of it.

4.0 RESEARCH METHODOLOGY

The aim of this research is to analyze the impact of project misalignment with business objectives on the overall project performance in the Greater Accra construction sub-region of Ghana using the TQM Model. The focus is to delve into the causes of project misalignment, impact on project objectives and performance in the Ghanaian construction industry. This chapter highlights the methodology, which comprises the research design, ethical considerations, and research methods involving samples, results, questionnaires and interviews.

4.1 Research Design

A research design is the arrangement of conditions for data collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure or simply put, the research design is the conceptual framework within which the research is conducted (Selltiz et al. 1959 cited by Kothari 2004). Research design refers to the conceptual framework within which the research is conducted. According to Saunders et al, (2008) there are three main types of research design; exploratory, explanatory and descriptive. The research designs differ in several ways especially how the research questions are formulated and the manner in which data is collected. An exploratory research design tries to find out what is happening, seeking new insights, asking questions and to assess phenomena in a new light (Robson, 2002). According to Saunders et al, the major emphasis of exploratory research is on the discovery of ideas and insights. The exploratory research could be conducted through a number of techniques including literature review, interviews, focus groups and case studies.

Descriptive research seeks to portray an accurate profile of persons, events or situations (Robson, 2002). This type of research is concerned with describing the characteristics of a particular individual, or of a group and is often used when a problem is well structured. Explanatory research design seeks to establish the causal relationships between variables. The approach used in explanatory research is to study a situation or problem in order to determine the cause-and-effect relationship among the variables (Saunders et al. 2009). In the context of this study where the researcher tries to find out the causes of project misalignment, describing the nature of construction in Ghana, and also finding out the existence of construction industry in the Greater Accra Region of Ghana, both exploratory and descriptive research design is used.

4.2 Ethical Considerations

Ethical consideration in research is critical because it prevents fabricating of data and therefore promotes the quest for knowledge, which is the major goal of research. Ethics are norms or standards for conduct that determines the difference between acceptable and unacceptable behaviors.

The research was well planned so that the chances of misleading results are minimized and meet ethical acceptability. The research is conducted with honesty such that works cited from other sources were duly

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

referenced. In addition, all participants involved in the study were fully informed on the objectives of the study and assured of full confidentiality. All respondents were asked to sign a consent form before being interviewed or given questionnaires. The consent form outlined the title and general nature of the study, assurance of confidentiality, the option to decline participation and that the results of the study will be made available to them should they wish to receive them. Briefly, the study was conducted with voluntary participation and informed consent of the respondents. The research considered these two main aspects of ethics;

- The individual values of the researcher relating to honesty, frankness and personal integrity.
- The researcher's treatment of other people involved in the study, relating to informed consent, confidentiality, anonymity and courtesy.

4.3 Research Methods

The research methods used in this research covers samples, results, questionnaires and interviews conducted collect information from the participants.

4.3.1 Samples

The study adopted a purposive sampling technique, to reach out to the respondents in the Greater Accra region who are involved in the construction of housing. In the case of this study, the respondents are the various stakeholders in the construction of housing in the Greater Accra Region. The study employed a sample size determination equation adopted by Slovin (1960) which gives an idea of how large a sample size needs to be to ensure a reasonable accuracy of results. The formula is given below.

$$n = \frac{N}{1 + Ne^2}$$

Where n = the sample size, N = the sample frame and e = margin of error of 5% (95% confidence interval). According to Oxford Business Group 2014, there are more than 1600 building contractors in Ghana. According to Slovin's formula, about 320 samples should be taken if the study is conducted nationwide (all ten regions). Since the research is centred on the construction of housing in the Greater Accra Region of Ghana, 120 respondents/stakeholders were sampled.

The stakeholders who sampled include clients, professional consultants and contractors who directly or indirectly undertake construction of housing in the Greater Accra Region. The clients are made up of Government, real estate developers, investors and other building owners. The government being the major client is represented by the Ministry of Road and Transports, Ministry of Water Resources, Works and Housing in giving out projects in Ghana (Gyadu-Asiedu, 2009).

The professional consultants include architects, quantity surveyors, geodetic engineers, structural engineers, electrical engineers and service engineers. Professional institutions such as Ghana Institution of Architects, Ghana Institution of Surveyors, and Ghana Institution of Engineers etc. regulate this group of stakeholders. The other group of stakeholders; contractors provide services such building of roads, housing, bridges, electrical works, plumbing works, and general building works.

4.3.2 Results

The researcher distributed 120 questionnaires to participants out of which 98 were completed and returned, giving a response rate of 81.7%. The researcher used descriptive statistics in the analysis of the questionnaire and the results displayed in frequency tables. The table highlights frequency, percentages, mean and standard deviation of the variables.

Description	Variable	No. of Respondents	Percentage (%)
Gender	Male	90	91.8
	Female	8	8.2
	Total	98	100.0
Age Category	Under 30 years	19	19.4

	30-39 years	24	24.5
	40-49 years	36	36.7
	Above 50 years	19	19.4
	Total	98	100.0
Educational Background	Construction Technician Certificate	41	41.8
	Higher National Diploma	27	27.6
	Undergraduate Degree	23	23.5
	Postgraduate Degree	7	7.1
	Total	98	100.0
Organizational Status	Project manager	35	35.7
	Civil engineer	23	23.5
	Quantity surveyor	19	19.4
	Supervisor	21	21.4
	Total	98	100.0
Years of Experience	Below 10 years	50	51.0
	10-19 years	18	18.4
	20-29 years	22	22.4
	Above 30 years	8	8.2
	Total	98	100.0

4.3.3 Questionnaires

The researcher developed the questionnaire based on the research questions. Initially, a pilot questionnaire was drafted and tested to ensure that the questions are clear and concise in order to have consistent answers that will satisfy the research objectives. The questionnaire is designed to collect data on respondents who are linked to construction in the Greater Accra region. The questionnaire has close-ended questions that requires the respondents to tick applicable boxes. In addition, there are open-ended questions that allows the respondents to express personal views to their satisfaction. The questionnaire is divided into two sections, A and B. The section A requested the background information of the respondents. The background information include gender, age, level of education, position held, type of construction work undertaken by the company and the years of construction experience of the respondents.

The Section B covers three major topics; project misalignment, nature of construction in Ghana and Total Quality Management. The researcher sought the opinion of respondents on Total Quality Management using a five-point Likert scale where 1 = strongly disagree, 2=disagree, 3=neutral, 4= agree, and 5=strongly agree. The study also attempted to determine the level of Total Quality Management implementation in the construction subsector of Ghana. As a result, the questionnaire asked the participants the degree or extent to which their company practice Total Quality Management principles as follows; 1 =very low, 2= low, 3=moderate, 4=high and 5=very high. The researcher administered the structured questionnaires to construction companies who were in turn requested to deliver them to their qualified site managers. To ensure conformity, the participants were given ample time to respond to the questionnaires.

4.3.4 Interviews

The researcher conducted interviews to many stakeholders in the construction sub-sector. The interviewees were allowed to fix meeting dates according to their schedule. The participants were given ample time to respond to questions. The questions asked during the interview revolved around both the primary and secondary objectives of the study. The interview was conducted on participants who are known to have knowledge and necessary interest in the study area and play key roles in the construction sub-sector of Ghana. Some of the questions centers on how they measure performance of projects,

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

strategies used to ensure alignment between project management and business objectives, concept of project misalignment, application of TQM models in the construction sub-sector.

4.4 Validity

The researcher conducted a Cronbach's analysis on the "factors affecting project misalignment" subscale of the study. This analysis checks the reliability of the data. It was found that the overall value of Cronbach's alpha for the variables was 0.813, which indicates that the subscale has an adequate level of inter-item reliability. According to Hair et al. (1998), the Cronbach's alpha values in the Table 4.1 below reveals that the measurement used exceeded the cut-off threshold of 0.7.

Table 4.1: Reliability Analysis

Variable	Cronbach's Alpha if Item Deleted
Lack of communication	0.839
Poor collaboration	0.834
Lack of shared domain knowledge	0.764
Lack of accountability	0.745
Conflicting personalities	0.720
Process non-compliance	0.741

The researcher ensured that the content of validity was guaranteed by reviewing the questionnaire and interview guide to make sure they address the research questions. In addition, the validity of the data was enhanced by collecting data from appropriate participants who are involved in construction projects in the Greater Accra Region.

This chapter presented the methodology adopted to address the research objectives. The specific topics addressed in the chapter include; the aim, research design, ethical considerations, research methods. The research methods presented covered the sample of data used for the analysis, results of the result, details of the questionnaires and interviews, and the validity of the data collected.

5.0 DATA AND RESULTS ANALYSIS

The type of data used in this research is both primary and secondary data. The primary data was sourced from participants who belong to the construction sub-sector of the Greater Accra Region. Both structured questionnaires and interview guides were used in the collection of the primary data. The nature of the information received from the participants is qualitative and it includes background information such as gender, age, level of education, type of construction work undertaken, years of construction experience etc. In addition, other information such as participants understanding of project misalignment, opinion on the factors of project misalignment in the construction sector, type of quality improvement program adopted by their organizations, the level of implementation of Total Quality Management in the Ghanaian construction subsector. The secondary data collected pertains to the total number of construction firms in the country, which was used in the determination of sample size for data collection.

The data collected was reviewed and uncompleted questionnaires discarded. The completed questionnaires were coded and the responses entered into SPSS, the Statistical Package for Social Sciences (version 23). The data on factors affecting project misalignment and participants' opinion on Total Quality Management were coded on a Likert scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. However, the data on the level of implementation of TQM in the Ghanaian construction industry is coded as 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.

The raw data was collected using structured questionnaires distributed in person, email and an online medium called "survey monkey". Since the focus of the research is on the construction of housing in the Greater Accra Region, the areas selected are on record to have major construction projects in the region. According to the population and housing census from the Ghana Statistical Service (2010), the selected districts have the highest percent of houses with the Accra Metropolis alone contributing 35.6% of houses in the region which is evident of its urban status. The researcher received the highest number of responses from participants in the Accra Metropolis where the major construction works are undertaken in the region.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

Table 4.2: Distribution Pattern among Target Population

Districts	Number of Responses
Accra Metropolis	48
Ga South	10
Ga West	10
Ga East	10
Tema Metropolis	20

The questionnaires were distributed via email and survey monkey to the areas where the researcher could not go because of time constraints. The researcher gave participants ample time to respond to the questionnaires and their feedback analyzed for completeness and coherence. The questionnaire captured the demographic characteristics of the respondents in the Section A. The demographic characteristics provided descriptive information on gender, age, level of education, experience, and position held. This information is relevant because it helps to ascertain the validity of the results obtained and to develop an understanding of the background of participants with respect to their educational level and years of experience.

The results revealed that the majority of the participants representing 91.8% of the respondents are male whiles 8.2% are female. The implication is that males dominate the construction sector in Ghana, since it involves rigorous or physical activities. The research captured participants with different age categories as their age contributes to their level of experience in the construction industry. Majority of the participants representing 36.7% belongs to 40-49 years age group. In addition, the results revealed that 24.5% of the respondents belong to 30–39-year group and 19.4% of the participants are either below 30 years or above 50 years. The researcher found out that the participants have at least construction technician certificate since the construction sector is a technical field that requires participants to have some form of practical training.

The research shows that 41.8% of the participants have construction technician certificate and 7.1% have postgraduate degree. Also, 27.6% and 23.5% of the participants have diploma and undergraduate degrees respectively. The participants involved in the study are project managers (35.7%), civil engineers (23.5%), quantity surveyors (19.4%) and supervisors (21.4%). The research revealed that 8.2% of respondents have more than 30 years construction experience whilst half of the respondents have less than 10 years working experience in the construction sector. In addition, 18.4% and 22.4% of the participants have 10-19years and 20-29years construction experience respectively.

5.1 Total Quality Management

The objective of the researcher is to analyze project misalignment with business objectives using Total Quality Management model. The researcher sought the opinion of respondents in the Greater Accra Region on TQM and the results ranked in Table 4.4. The participants ranked customer satisfaction as the main component of Total Quality Management designated TQM1. The implication is that customer satisfaction is the primary focus of businesses that adopt TQM principles and philosophies. The 2nd ranked response is the agreement that Total Quality Management is a management philosophy and practice, which ensures efficient and effective use of available resources to help achieve the objectives of the business. The 3rd ranked labelled TQM3 by the respondents is that team work and participation is very necessary for the attainment of project objectives as well as continuous improvement. The principle ranked 4th is that support from management or leadership determines the success of new change objectives or initiatives. The participants ranked the role of management in providing adequate resources in every aspect of the business as the 5th principle or component of TQM. Furthermore, the respondents ranked training and education as the 6th principle which is important for the implementation of TQM. The least ranked principle is supplier involvement meanwhile; the respondents asserted that supplier involvement is crucial in supporting quality improvement.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

Table 5.1 Principles of Total Quality Management

Principles of TQM	N	Mean	Std. D	Rank
TQM 1	98	4.38	0.487	2nd
TQM 2	98	4.55	0.500	1st
TQM 3	98	3.60	0.492	3rd
TQM 4	98	3.20	0.984	7th
TQM 5	98	3.55	0.839	4th
TQM 6	98	2.35	1.393	5th
TQM 7	98	3.28	0.743	6th

5.2 Application of Total Quality Management

The research also sought to find out the extent of the application of Total Quality Management principles and philosophies in the construction sub-sector in Ghana. The researcher collated the responses from participants in Table 4.5 showing the extent to which construction companies in Ghana practice TQM principles. The respondents indicated the level of implementation of TQM principles in their companies as very low, low, moderate, high and very high. The outcome of the survey shows that the three most implemented components of TQM in Ghana are management leadership, work environment and culture, and supplier management.

The implementation of management leadership as TQM principle in the construction companies is such that top management ensures that every employee knows the mission of the company and its business objectives. Likewise, top management strongly promotes staff involvement in quality management and improvement activities in the construction sector. The understanding is that management empowers employees whiles they maintain communication links between the two parties in the construction sub-sector. The respondents specified that work environment and culture is considered by the organizations that implement TQM principles ensuring that all working environments are pleasant.

Furthermore, positive morals such as trust, honesty, and hard work are highly anticipated from employees. The other notable principle implemented in the Ghanaian construction subsector is supplier quality management where management selects suppliers based on the quality they can offer or deliver. The suppliers are requested to maintain high technical standards while meeting quality specifications.

Table 4.5: Implementation of Total Quality Management

Implementation of TQM	N	Mean	Std. D	Rank
Management Leadership	98	3.36	1.194	1st
Work environment and culture	98	3.31	0.876	2nd
Supplier quality management	98	3.29	0.726	3rd
Resource Management	98	3.04	1.009	4th
Measurement and feedback	98	2.97	0.946	5th
Continuous improvement	98	2.83	0.934	6th
Systems and processes	98	2.74	0.791	7th

The survey revealed the factors that influence misalignment of construction projects. In Ghana, the notable or highest ranked factors identified are lack of communication, poor collaboration, and process non-compliance. The other factors identified but with the least ranking are conflicting personalities, lack of accountability, and lack of shared domain knowledge. Furthermore, the opinions of respondents on the principles of Total Quality Management and its implementation have been collated and analyzed. The companies that implement TQM lay more emphasis on principles such as management leadership, work environment and culture, and supplier quality management as compared to the other TQM principles.

https://damaacademia.com/pmsj/ August 2022 Pages: 20-46 Volume 6 | Issue 8

6.0 CONCLUSIONS

The study followed ethical standards with the consent of the participants sought prior to data collection. Out of the 120 questionnaires distributed, 98 were completed and returned representing 81.7% response rate. The researcher conducted interviews on respondents on various topics including the stakeholder engagement in projects, extent of application of TQM in Ghana, and causes of project misalignments. The data collected from the respondents using the questionnaires was coded and the responses entered into the Statistical Package for Social Sciences, SPSS for analysis. The results of the findings revealed respondents with many years of working experience in the construction sector serving as project managers, civil engineers, quantity surveyors, supervisors among others. These respondents have different levels of education; construction Technician Certificate (41.8%), Diploma (27.6%), Undergraduate degree (23.5%) and postgraduate degree (7.1%). Males representing more than 90% dominate the workers in the construction sector in Ghana.

The respondents ranked some factors identified from literature to influence project misalignment and the three highest ranked factors are lack of communication (1st), poor collaboration (2nd) and process non-compliance (3rd). The findings revealed that customer satisfaction is the main component of Total Quality Management. In addition, the respondents agreed that TQM is management philosophy and practice, which ensures efficient and effective use of available resources to help achieve the objectives of the business. The findings also revealed that teamwork and participation is very necessary for the attainment of project objectives as well as continuous improvement. Furthermore, the findings revealed that the components of Total Quality Management principles implemented in the Ghanaian construction sector are management leadership, supplier quality management, and work environment and culture.

The findings of the study revealed that even though the construction industry in Ghana is dominated with professionals with many years of practical experience, there is no regulatory body dedicated to ensuring stakeholder safety, and increasing professionalism in the industry. Due to the absence of a regulatory framework, it is very difficult to measure the extent of engagement of all stakeholders in the construction subsector. The implication of this factor in the construction sector is lack of accountability. Most clients and contractors are not held accountable when projects especially those awarded by government fail. Moreover, the interviews conducted revealed that the level of implementation of Total Quality Management in the construction sector is low and only few construction firms have adopted the model in their operations.

The purpose of the research was to assess the extent of application of total quality management principles and philosophy in the construction project sub sector. The findings of the research revealed that the main causes of misalignment of construction projects in Ghana are lack of communication, poor collaboration, process non-compliance and lack of accountability. In addition, the research revealed that the level of implementation of Total Quality Management in the country is low and the few stakeholders who implement the model emphasize on management leadership, work environment and culture, and supplier quality management compared to the other TQM principles. The researcher found out that the lack of regulatory authority to monitor and evaluate construction works in the region exposes the construction sector to several challenges including housing deficits amidst the numerous building construction contracts awarded each year by government and other clients.

References

Abbasi, Y. G. & Al-Mharmah (2000) 'Project management practice by the public sector in a developing country' *International Journal of Project Management*, 18(3), pp105-109. Accra Metropolitan Assembly (2101), Medium Term Development Plan 2010-2013

Ackah, D., (2020). "The Impact of the World COVID-19 Pandemic on Project Financing" Project Management Scientific Journal, Volume 4, Issue 4, pp.01-13

Ackah, D., (2020). "The Financial Implication on the Global COVID 19 Pandemic on African Countries" Finance & Management Engineering Journal of Africa (FMEJ), Volume 2, Issue 4, pp.05-17.

Ackah, D., (2020). "Roots of Project Failure and Abandonment in Developing Countries" Project Management Scientific Journal, Volume 4, Issue 4, pp.45-61.

Ackah, D., (2020). "Foundations of Project Letdown and Neglect in Ghana" Project Management Scientific Journal, Volume 4, Issue 4, pp.32-44.

Ackah, D., (2020). "Effects of Project Failure and Abandonment" Project Management Scientific Journal, Volume 4, Issue 4, pp.14-31.

Ackah, D., (2020). "Causes and Negative Effect of Abandonment Projects in Ghana" Dama Academic Scholarly Journal of Researchers (DASJR), Volume 5, Issue 4, pp.14-25.

Ackah, D., (2020). "The Influences on Ghanaian Government Project Failure" Dama Academic Scholarly Journal of Researchers (DASJR), Volume 5, Issue 4, pp.26-36.

8Ackah, D., (2020). "The Distinction between Project Failure and Project Management Failure" Dama Academic Scholarly Journal of Researchers (DASJR), Volume 5, Issue 4, pp.01-13.

Antony, J.; Antony, F.J.; Kumar, M. & Cho, B.R. (2007). Six Sigma in service organizations: Benefits, challenges and difficulties, common myths, observations and success factors. *International Journal of Quality and Reliability Management*, Vol. 24, No. 3, pp 294–311.

Anvuur, A., Kumaraswamy, M. (2006), "Taking Forward Public Procurement Reforms in Ghana", CIB W107 Construction in Developing Economies International Symposium "Construction in Developing Economies: New Issues and Challenges" January 18th – 20th; 2006 – Santiago, Chile

Assibey-Mensah, G.O. (2008), "Ghana's Construction Industry and Global Competition: A research Note", Journal of Black Studies, Sage Publication

Aubrey, C. A. and Felkins, P. K., Teamwork Involving People in Quality and Productivity Improvement. Quality Press, Milwaukee, WI, 1988.

Ball, M. and Wood, A. (1995) How many jobs does construction expenditure generate? Construction Management and Economics,

Ball, M. and Wood, A. (1996) Does building investment affect economic growth? Journal of Property Research, 13(2). Ball, R. (1981) Employment created by construction, expenditures, Monthly labour Review, 104, 38-44.

Bon, R. (1988). Direct and indirect resource utilization by the construction sector: the case of the USA since World War II, Habitat International, 12(1), 49–74.

Bon, R. (1992). The future of international construction: secular patterns of growth and decline. Habitat International, 16(3), 119–28 Census and Statistics Department of HKSAR (1985–2002) Hong Kong. Monthly Digest of Statistics, Census and Statistics Department of HKSAR, Hong Kong.

Bon, R. and Pietroforte, R. (1993) New construction versus maintenance and repair construction technology in the USA since World War I., Construction Management and Economics, 11, 151–62.

Bon, R., Birgonul, T. and Ozdogan, I. (1999) An input– output analysis of the Turkish construction sector, 1973– 1990: a note. Construction Management and Economics, 17, 543–51.

Burati, J. L. and Farrington, J. J., Cost of quality deviations in design and construction. Source document 29, Construction Industry Institute, Austin, TX, 1987.

Burati, J. L. et al., Quality management organizations and techniques. Journal of Construction Engineering and Management, 1992, 118(1), 112-128.

Chen, J.J. (1998) The characteristics and current status of China's construction industry, Construction Management and Economics, 16, 711-719.

Cheung, S.-O.; Suen, H. C. H.; Cheung, K. K. W. 2004. PPMS:a Web-based construction project performance monitoring system, Automation in Construction 13: 361–376.

Chikweche, Tendai & Fletcher, Richard. (2014). "Rise of the middle of the pyramid in Africa": Theoretical and practical realities for understanding middle class consumer purchase decision making. Journal of Consumer Marketing. 31. 10.1108/JCM-10-2013-0729.

conceptual framework", Construction Management and Economics, Vol. 19, pp85-95.
Crosby, P. B., Cutting the Cost of Quality. Farnsworth, Boston, 1967.
Culp, G. et al., Implementation TQM in consulting engineering firm. Journal of Management in Engineering, 1993, 9(4), 340-366.
Deming, W. E., Out of the Crisis. MIT CAES, Cambridge, MA, 1986.
Deming, W. E., The New Economics for Industry, Government, Education. MIT, Cambridge, MA, 1993.
Development, New Haven, Yale University Press
Dickson, K. B. Benneh, G. (2001). A new geography of Ghana, Revised edition. Longman Group Ltd, England.
Doyle, D., ISO 9000 Quality Systems Handbook. Butterworth, London, 1994.
Drewer, S (1997) Construction and development: Further reflections on the work of Duccio Turin. Proceedings of the First International Conference on Construction Industry Development, Singapore 9- 11 December.
Dubois, A. and Gadde, L.E. (2002). "The construction industry as a loosely coupled system:
Dumas, R. A., Organizationwide quality: how to avoid common pitfalls. Quality Progress, 1989, 22(5), 41-44
Eccles, R.G. (1981). "The quasifirm in the construction industry." *Journal of Economic Behavior and Organization* 2 (4), 335357. external linkages." *Construction Management and Economics* 12, 287293.
Ferguson, H. and Clayton, L. (Eds), Quality in the Constructed Project: A Guideline for Owners, Designers and Constructors, Vol 1. ASCE, New York, 1988.
Field, B. and Ofori, G. (1988) Construction and economic development – a case study. Third World Planning Review, 10(1), 41–50.
Field, Tom. (1997). .When bad things happen to good projects., CIO magazine, Oct 15, 1997, Vol. 11, 2; pg. 54, 6 pgs.
Ghana Statistical Service (2012), 2010 Population and Housing Census. National Analytical Report. Ghana Statistical Service, Accra.
Ghana Statistical Service (2012), Greater Accra Regional Report, 2010 Population and Housing Census Report, Ghana Statistical Service, Accra.
Ghana Statistical Service (2012). 2010 Population and Housing Census. Summary Report of Final Results, Ghana Statistical Service, Accra.
Groák, S. (1994). "Is construction an industry?: note towards a greater analytical emphasis on
Gunaydin, H. M., TQM in the Construction Industry. MS Thesis, Illinois Institute of Technology, Chicago, IL, 1995.
Hellard, R. B., Total Quality in Construction Projects. Telford, London, UK, 1994.
Hillebrandt, P.M. (1985) *Economic Theory and the Construction Industry*, 2nd Edn. Macmillan, London
Hirschman, A.O. (1958), .Interdependence and Industrialization, in *The Strategy of Economic*
Hoffman, Thomas. 2003. .Corporate Execs Try New Ways to Align IT with Business Units.Computerworld. October 27, 2003
Hua.B.G. (1995). Residential construction demand forecasting using economic indicators: a comparative study of artificial neural networks and Multiple Regression. School of Building and Estate Management, National University of Singapore.
Hulme, Martyn R. (1997). .Procurement Reform and MIS Project Success., Journal of Supply Chain Management,
Institute of Statistical, Social and Economic Research (2000). The State of the Ghanaian Economy in 1999. Legon: University of Ghana.
Institute of Statistical, Social and Economic Research (2011). The State of the Ghanaian Economy in 2010. Legon: University of Ghana.
Johnson, Jim, et al. (2001). .Collaborating on Project Success..
Joiner, B. L. and Scholtes, P. R., The quality manager's new job. Quality Progress, 1986, 19(10), 52-56.
Journal of Six Sigma and Competitive Advantage, Vol. 1 No. 1, pp. 97-111.
Juran, J. M. (Ed.), Juran's Quality Control Handbook, 4th edn. McGraw-Hill, New York, 1988.
Kagioglou, M., Cooper, R. and Aouad, G. (2001). "Performance management in construction: A conceptual framework." Journal of Construction Management and Economics, 19(1), 85-95.
Kagioglou, M., Cooper, R., Aouad, G. (2001), "Performance Management in Construction: a
Kubal, M. T., Engineered Quality in Construction. McGraw-Hill, New York, 1994.

Kume, H., Statistical Methods for Quality Improvement. Association for Overseas Technical Scholarship, Tokyo, 1985.

Kwak, Y. H. & Anbari, F. T. 2006. Benefits, obstacles, and future of six sigma approach. *Technovation,* 26, 708-715.

Kwaku Ahmed Lamia Hatira Paul Valva "The Construction Industry in Ghana, West Africa "How can the construction industry in Ghana become sustainable?" Department of Strategic Sustainable Development Blekinge Institute of Technology Karlskrona, Sweden 2014

lami, M., Kaizen, the Key to Japan's Competitive Success. Random House, New York, 1986.

Lean, S.C. (2001), Empirical tests to discern linkages between construction and other economic sectors in Singapore, Construction Management and Economics, 13, 253-262.

Ledbetter, W. B., The Quality Performance Management System: A Blue Print for Implementation. Publication 10-3, Construction Industry Institute, Austin, TX, 1990.

Leicht, Michael. (1999). .Managing User Expectations.. University of Missouri St. Louis epublication.

Lewis, J. P. (2007), *'Fundamentals of Project Management,* 3rd ed, New York: AMACOM.

Mears, P., Quality Improvement Tools and Techniques. McGraw- Hill, New York, 1995.

Michael Behm Construction Sector, Journal of Safety Research 39 (2008) 175-178

Nagasaku, C. and Oda, M., Planning and Execution of Quality Control. Juse Press, Tokyo, 1965.

Navon, R. 2005. Automated project performance control of construction projects, Automation in Construction 14:467-476

Oberlender, G. D., Project Management for Engineering and Construction. McGraw-Hill, New York, 1993.

O'Brien, J. J., Construction Inspection Handbook, 3rd edn. VNR, New York, 1989.

Ofori G. (1980) "The Construction Industries of Developing Countries: the Applicability of Existing Theories and Strategies for their Improvement and Lessons for the Future - the Case of Ghana", unpublished Ph.D. Thesis University College, London.

Oxford Economics. 2012. Bright Continent The future of Africa's opportunity cities. African Cities Income and Consumer Spend Outlooks to 2030: 1-10. http://www.agenceecofin.com/images/finance/119_OE_African_Cities_exec_summ.pdf. (Accessed March 10, 2018).

Park, S.H. (1989) Linkages between industry and services and their implications for urban employment generation in developing countries. Journal of Development Economics, 30(2), 359–79.

Perisco, J., Jr., Team up for quality improvement. Quality Progress, 1989, 22(1), 33-37.

Peters, T. J., Thriving on Chaos. Harper & Row, New York, 1987.

Pietroforte, R. and Bon, R. (1995) An input–output analysis of the Italian construction sector, 1959-1988.Construction Management and Economics, 13(3), 253–62.

Rameezdeen.R, Nisa.z et al,(2006). Study of Linkages Between Construction Sector and other Sectors of the Sri Lankan Economy. Department of Building Economics University of Moratuwa Sri Lanka.

Rounds, J. L. and Chi, N. Y., TQM for Construction. Journal of Construction Engineering and Management, 1985, 111(2), 117-127.

Sandholm, L. and Sorqvist, L. (2002), "12 requirements for Six Sigma success", *Six Sigma Forum Magazine*, Vol. 2 No. 1, pp. 17-22.

Schroeder, R.G., Linderman, K., Liedtke, C. & Choo, A.S. (2008). Six Sigma: Definition and underlying theory, *Journal of Operations Management*, Vol. 26, pp 536–554.

Selltiz, Claire: Jahoda, Marie, Deutsch, Morton, and Cook, Stuart W., *Research Methods in Social Relations,* rev. ed. New York: Holt, Rinehart and Winston, Inc., 1959.

Sleeper, A. 2005. *Design for Six Sigma Statistics, Chapter 1-Engineering in a Six Sigma Company*, McGraw-Hill Professional.

Smith, S., How to Take Part in the Quality Revolution: A Manage- ment Guide. PA Management Consultants, London, 1988.

Sönderlund, J. (2002), "On the Development of Project Management Research: Schools of Thought and Critique", International Project Management Journal, 8(1), 20-31.

Songwe Vera. 2014. Africa's Capital Market Appetite: Challenges and Opportunities for Financing Rapid and Sustained Growth. Foresight Africa Report: 1-44.

Stamatis, D. H. 2003. *Six Sigma fundamentals: a complete guide to the system, methods and tools*, Productivity Press Publication.

Stasiowski, F. A. and Burstein, D., Total Quality Project Management for the Design Firm. Wiley, New York, 1994.

Tanle, A. & Awusabo-Asare, K. (2007): The kaya yei phenomenon in Ghana: Female Migration from the Upper-West region to Kumasi and Accra. The Oguaa Journal of Social Science. 4 (2): 139-164.

Tanle, A. (2010). Livelihood status of migrants from the northern savannah zone resident in the Obuasi and Techiman Municipalities. A Ph.D. Thesis submitted to the Department of Population and Health, University of Cape Coast, Cape Coast, Ghana.

Tanle, A. and Kendie, S. B. (2013). Sanitation: A drawback to achieving the Millennium Development Goals? The situation in Ghana. Journal of Arts and Social Sciences, 1(2):125-147

The Business Roundtable, More Construction for the Money-- Summary Report of the Construction Industry Cost Effectiveness Project. The Business Roundtable, New York, 1983.

Turin, D.A. (1969) Construction Industry, based on the Proceedings of the International Symposium on Indusm'al Development held in Athens in Nov-Dec 1967, New York, Monograph no. 2.

Turin, D.A. (1969) Construction Industry, based on the Proceedings of the International Symposium on Indusm'al Development held in Athens in Nov-Dec 1967, New York, Monograph no. 2

Victor Osei The construction industry and its linkages to the Ghanaian economy-polices to improve the sector's performance International Journal of Development and Economic Sustainability Vol. 1, No.1, March 2013, pp56-72 Viewed 1/17/2018

Wells, J (1998) The Informal Sector and the Construction Industry, Proceedings of the first meeting of CIB TG 29, Arusha, Tanzania