DEVELOPMENT OF QUALITY CULTURE IN CONSTRUCTION FIRMS: THE ROLE OF LEADERSHIP AND HUMAN RESOURCE MANAGEMENT

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ABSTRACT: Total quality management (TQM) has the potential to improve business results, greater customer satisfaction, worker involvement, team working and better management of workers within organisation. However, many organisations have been continually struggling with its implementation. The successful TQM implementation within the organization requires a cultural change and it being recognised as an important aspect of total quality development. Total quality is a holistic concept, and requires the motivation of all members of an organisation to seek customer satisfaction. Hence, the aspects of leadership and human resource management (HRM) are to be considered for the development of quality culture in organisation. Leadership and HRM can reinforce human relationship and group consciousness, raise employee competence, create positive job attitudes, provide a condusive work culture and achieve culture change. Therefore, they act as the catalyst for the implementation of TQM. The paper will discuss in general, the factors that influence the development of quality culture in organisation. Further, its will discuss how the leadership and HRM factors can help for a quality cultural shift in an organisation.

Keywords : Construction Industry, Quality Culture, Total Quality Management, Leadership, Human Resource Management.

1.0 INTRODUCTION

The construction industry is being viewed as one with poor quality emphasis compared to other sectors like the manufacturing and service sectors (Kubal 1994, Kanji & Wong 1998). Numerous criticisms have been directed to the construction industry for generally shoddy workmanship. It not only the final product that is subject to criticisms but the processes, the peoples, the materials etc are under tremendous pressure for better quality in construction. This is mainly the result of the industry's failure to achieve the expected performance level in delivering its finished product and its customer service. (Dulaimi *et al.* 2001).

Several studies and reports recognise that problems surrounding poor construction quality constitute a major issue requiring rapid and positive improvement (BRE 1982, BEDC 1987, Burati & Farrington 1987, Griffith 1990). Aspects such as inadequate information, poor communications, poor care in workmanship, and lack of site supervision will remain as a continuing problem until the cultural patterns and the

reasons behind them are understood, appreciated and taken into account (Abdel-Razek 1998).

The American Society for Quality (2005) notes that in the few years since the turn of the century, the quality has moved beyond manufacturing into service, healthcare, education, construction and government sectors. Hence, total quality management (TQM) is increasingly being adopted by construction companies as an initiative to solve quality problems in the construction industry and to meet the needs of the customer continuously (Kanji and Wong 1998). TQM has the potential to improve business results and competitiveness, greater customer orientation and satisfaction, worker involvement and fulfilment, team working and better management of workers within companies.

However, construction firms have been continually struggling with its implementation (Haupt & Whiteman 2004). The implementation of a TQM philosophy within the organization requires a cultural change (Sommerville *et al.* 1999) and its being recognised as an important aspect of total quality development (Adebanjo & Kohoe 1998). However, the issue surrounding quality culture and their development has not been comprehensively studied (Evans & Dean 2003, Gallear & Ghobadian 2004).

2.0 CHARACTERISTIC AND CULTURE OF THE CONSTRUCTION INDUSTRY

The construction industry has characteristics that separate it from all other industries. These characteristics which impact significantly upon its cultural framework are: the physical nature of the product; the product is normally manufactured on the client's premises; many projects are one-off designs and lack available prototype models; the arrangement, where design has normally been separate from construction; the organisation of the construction process; and the methods used for price determination (Harvey & Ashworth 1993).

According to Kanji & Wong (1998), the construction industry has numerous problems because of its complicated nature of operation. This industry is comprised of a multitude of occupations, professions and organizations and they are involved in the different phases of a construction project. The client, consultants, contractor and sub-contractors of a construction project all have a role to play in delivering a quality project. Failure of any of the parties will seriously affect the quality of the final project.

Rowlinson & Walker (1995) point out that the construction industry is also characterized by its non-standardization. Production processes are to some extent different from one another. Hence, no universal standard or specification

can be applied to the product, which leads to difficulties in quality assurance. There are excessive changes to the details of the design of a project are typical throughout the construction process. Quality is often at risk because of the excessive changes. Furthermore construction industry is categorized as a fragmented, hierarchical, extremely competitive, male dominate and casual industry (Barthorpe *et al.* 2000).

The current construction culture also perceived by some as suffering from entrenched attitudes, poor communication, lack of trust and generally adversarial relationships at all levels. Many of the characteristics are rooted in management style and practices which have evolved over the years. Unless the attitudes and behaviours associated with these practices change, there will be no significant progress in improving the situation. (ECI 1996)

Hence, the Construction Industry Board (reported in Barthorpe *et al.* 1999) advocate that, it is imperative to convert the current vicious circle of poor image, poor performance, poor delivery to a virtuous circle of improved delivery and better image, attracting the right people to continue the process. TQM can help to reverse this situation. Although, it is not a magic pill or panacea for all illnesses, it will, if properly implemented, help construction companies improve and will help all the parties come closer.

3.0 QUALITY IN CONSTRUCTION INDUSTRY

Aggressive competition, both at the regional and international level, has imposed higher quality levels in almost all business activities and sectors. To ensure their position in the emerging international market, construction firms are actively engaged in trying to achieve internationally accepted quality levels based on two major framework of TQM – the ISO 9001 family of quality standard, and quality award criteria. Studies indicate that TQM reached an integrated set of commonly accepted practices as a result of the wide acceptance of these two frameworks (Wiele 1998 cited in Kujala 2004). They require company wide organizations to establish a well-structured and explicit system that identifies, documents, coordinates and maintain all the key quality related activities throughout all relevant company and site operations to ensure customer quality satisfaction and economical costs of quality (Arditi and Lee 2003).

In the context of construction, quality has a three-fold meaning (Hart, 1994): it means getting the job done on time; it means ensuring that the basic characteristics of the final project fall within the required specifications; it means getting the job done within budget. A quality construction project has to comprise all these dimensions. Actually,

quality in construction is directly connected with conformance to specifications and fitness for use. According to Levitt and Samelson (1993) the TQM mission in construction is to build a quality product - i.e. an error-free one - for the user by preventing errors in the construction process by integrating quality, productivity, and safety. A major emphasis is on doing work right the first time, thereby cutting the amount of rework required to create construction that meets the user's requirements. This statement is supported by Leon (1995) who characterised the construction quality as follows:

> *"In the construction realm, quality is directly linked to the formal contract requirements, specifications, agreements, client preferences, and instruction that undoubtedly influence every technical and commercial decision made from the boardroom to the project site. Some contracts may need to be clarified due to ambiguity, grey areas and shortcomings. The attempt is therefore to identify, mutually agree and satisfy project requirements. This scenario facilitates quality to be defined as' Meeting Agreed Requirements'. It should be noted that such a definition provides for the meeting of external and internal requirements; as in the external and internal customer".*

4.0 ORGANISATION AND QUALITY CULTURE

Culture is used to describe the collection of soft management and behavioral variables that form the psyche of the business organization (Railey & Clare-Brown 2001). There is multitude of definitions of culture, each with its own slight variation depending on the focus of study, but most suggest culture is the pattern of arrangement, material or behaviour which has been adopted by a society (corporation, group, or team) as the accepted way of solving problems. As such, culture may be taken to include all the institutionalized ways and the implicit beliefs, norms and values and premises which underline and govern behaviour (Ahmed *et al.* 1999).

Many scholars believe that organizational culture is important in successful TQM implementation. For example, Evans & Dean (2003) stress that the organizational culture needed to support TQM. Hence, changing corporate culture or organizational culture is recognized as one of the primary conditions for successful implementation of total quality

management (Hildebrandt *et al.* 1991). It has been suggested that those organisations attempting to implement or manage quality programs need to pay more attention to the development of the appropriate quality culture (Dellana & Hauser 1999).

Gryna *et al.* (2007) defined quality culture as the pattern of habits, beliefs and behaviour concerning quality. They stress that having a positive quality culture is an essential in achieving the quality goals of a company. According to Saha & Hardie (2005), culture of quality is one that: promotes leadership rather than supervision; inspires commitment on the part of staff to the chosen quality activities; uses teams as main style of management; allows staff at all levels to participate in work related decisions; promotes pride in workmanship; eliminates fear; and inspires people to seek continuous improvements. This type of culture cannot be ordered by management, it must instead be an integral part of how the organisation carries out its business. The existence of a strong quality culture should help a construction organisation achieve client satisfaction as well as sustaining competitive advantage by delivering higher quality service and producing higher quality facilities (Yasamis *et al.* 2002)

There are varieties of cultural influences on individuals and stakeholder which shape their expectations. There were referred to as the frames of reference which include national culture, vocational culture (industry, institutional and professional culture) and organisational culture (adapted from Johnson *et al.* 2007). Hence, the development of quality culture in organisation is influenced by these frames of reference. Laurent (1989) observed that national culture may shift but very slowly, and argued that while organisational culture may be more amendable to change, real changes in national culture may take generations to evolve. Furthermore Laurent (1992) point out that national culture is also quite insensitive to the transient culture of the specific industry. Indeed, the organisational culture appears to be stronger influence than vocational and national culture in developing a quality culture in construction organisation.

Culture can be divided into two major components of intrinsic (values, beliefs, assumptions, 'who and what we are', 'what we find important') and extrinsic elements (behaviour, norms, rituals, symbols, 'how we go about things around here'). The intrinsic element is a psychological element while the extrinsic element is behavioural. These elements also appear to have an individual and a collective aspect, the classification of which is on a continuum from some negative position to a positive position. The quality culture is therefore made up of a collection of individual cultures and other sub cultures within the environmental constraints and promotions of the organisation.

Although culture is unique to each organisation (Trought 1995), it is generally agreed that certain dimensions commonly define quality culture. There are thirteen (13) important dimensions of quality culture which TQM practitioners and researchers generally agree should be present in organizations whose culture complements TQM implementation (Gryna *et al.* 2007, Geotsch & Davis 2006, Gallear & Ghobadian 2004, Kriemadis 2004, Evans & Dean 2003, Eva Rita 2003, Ngowi 2000, Johnson 2000, Adebanjo & Kehoe 1999, Bubshait & Ali 1995, Bergman & Klefsjo 1994, Handfield & Gosh 1994). This include leadership and top management commitment, customer focus, continuous improvement, education and training, teamwork, worker involvement, empowerment, supplier partnership, rewards and recognition, communication, motivation, organisation structure, and strategic and quality policy. Most of these dimensions are related to leadership and human resource management (HRM). Hence, leadership and HRM are playing a major role in organisational transformation towards TQM based culture.

5.0 ISSUES AND PROBLEMS IN QUALITY CULTURE

The one common denominator that led to failure in all of the previous quality efforts was that they did not change the culture or the environment in which all these tools and processes were being used (Detert *et al.* 2000). If the TQM effort is inconsistent with the organisational culture, the effort will be undermined (Evans & Dean 2003). The Egan Report on Rethinking Construction (Egan 1998) stresses the need for the industry to make substantial changes in its culture and structure, as a driver for improvements inefficiency, quality and safety.

As reported by Kajewski & Weippert (2001), research indicates that one of the last available 'mechanisms' left for organisations to improve their competitive position within the construction industry is by considering its people (culture) along with its technology. In other words, if one wants to make construction industry organisations, groups and project teams more efficient and effective, then one must better understand the role that culture plays within them (Schein1997). Unfortunately, this transformation of personalities (culture) and traditional processes is not easy (Michel 1998), characteristically hindered by the industry's unique and determined way of 'doing things' the way it always has, and by its deeply embedded and resistive nature to change.

ECI (1996) highlight that the construction culture is perceived by some as suffering from entrenched attitudes, poor communication, lack of trust and generally adversarial relationships at all levels. Many of the characteristics are rooted in management style and practices which have evolved over the years. Unless the attitudes and behaviours associated with these practices change, there will be no significant progress in improving the situation.

Furthermore, current issues such as building and road failures during construction, increasing rate of accidents occurring on construction site, prevalence of abandoned construction sites, project delayed, increasing complaints on building defects, generally poor quality of completed projects, and uncaring attitudes of contractors to environmental issues has tarnished the imej of the industry. These incidents have raised public questions with regard to quality, safety and environmental practices among those engaged in the construction sectors.

Hence, this situation show the problem that the construction industry has is one of poor quality culture. The whole industry appears to start form the standpoint that the customer has to look after him or herself and that it is not necessarily the job of the contractor (or the consultants) to do that. There can be no doubt that in terms of quality the construction industry has improved enormously in recent years but this improvement appears only in regard to certain aspects of the construction process. Sites may be better managed and houses may be better designed than they were ten years ago but final delivery is still not good enough. This because industry is not truly customer focused. The industry does not see quality as a whole issue driven by satisfying customer need but as series of procedures dealing with design, materials and site safety (McGeorge & Palmer 2002). Therefore, there is an urgent need to create awareness and greater emphasis on the development of quality culture in construction industry.

5.1. A Change in the Culture of the Construction Industry

Culture is a key concept in improvement. If the organisation is to change in a way that recognises the need to be able to produce superior levels of quality, every person involved in the process must alter their beliefs and attitudes that create the sense of what is, or is not accepted. The culture of construction that currently exists is one that needs

remedy and long-term improvement (McCabe 2004). Construction Task Force (1998) advocate that, If the industry is to achieve its full potential, substantial changes in its culture are required.

Therefore, the successful implementation of a TQM philosophy within the construction organisation requires a culture change, which is recognised as an important aspect of total quality development. Brody (as reported in Blackburn & Rosen 1993) argued that TQM requires a change in organizational culture, a fundamental change in the way individuals and groups approach their work and their roles in the organization, that is, from an environment of distrust and fear of reprisal to one of openness and trust where creativity can flourish; from working as individuals to working as teams; from protection of organizational turfs to the breakdown of departmental barriers; from an autocratic management style of direction and control to a softer style of team leader and coach; from power concentrated at the top to power shared with employees; from a focus on results to a focus on continuous improvement of the processes that deliver the results; and finally a change from making decisions based on gut-feel to an analytic, fact-based approach to management.

Cultural change aims to change the existing culture of an organization. A change in culture and philosophy necessitates changes in peoples' behaviour. Changes in individuals are aligned to and affected by organizational change. If organizations are cultures then cultural change is organization change (Bate 1994). Culture in organizations has been described as patterns of shared assumptions (Schein 1991) socially acquired and shared knowledge that is embodied in organizational frames of reference (Martin 1992) or as common and clear understandings (Meyerson 1991). Hence, the implementation of TQM requires changes to the shared assumptions, frames of reference, and understandings that most organizations have developed through interaction with their environment (Ngowi 2000). This is because these philosophies and practices are invariably embedded with their own set of cultural beliefs, norms, values and assumptions (Riley & Clare-Brown 2001). In order to implement TQM approach, the construction organisation must understand the underlying culture base and set this against TQM model. This requires a cultural and behaviour shift in the construction organisation which a change in values, organizational structure, the way people work together, and the way people feel about participation and involvement (Hart & Schlesinger 1991). According to Baden (1993) this cultural shift that it requires can be summarised in Table 1.

Table 1: The Cultural Shift Required For TQM (Source: Baden 1993)

From	**To**
Meeting specification	Continuous improvement
Complete on time	Satisfy customer
Focus on final product	Focus on process
Short-term view	Long-term view
Inspection-based quality	Prevention-based
People as cost burden	People as assets
Minimum cost suppliers	Quality suppliers
Compartmentalised organisation	Integration
Top-down management	Employee participation

Organisation culture however is a reflection of social culture and this means that it is difficult to change, since it is vested in the rules that hold society together. However it is not impossible to introduce new organisational culture into the work environment. Evidence of this can be seen in the success of Japanese companies operating overseas who have successfully planted their organisation culture, albeit with variation, into a social system wholly different from their own (McGeorge & Palmer 2002). There are ways in which organisation culture can be change.

As Makin *et al.* (1989) suggest, there is some source that initiates the change. This source must have sufficient power to be able to influence others in the direction of the desired change. In organisational change programmes, the source is usually located somewhere in the management hierarchy. There is, in fact, a view that any organisational change will only be successful if it is initiated by top management as they are the only group with sufficient power to make the change programme happen. It is only top management who have the authority to initiate, standardise and institutionalise real, irreversible change (Dale *et al.* 1997).

Hence, a shift in management style is necessary to allow change to happen (Bell *at al.* 1994). Leaders of a change process need to realise that most changes within an organisation will usually cause and expect some change in its existing culture and sub-cultures – i.e. change in certain values, attitudes, assumptions, and behaviours, etc. Therefore, having a better understanding of the effects change has on the sub-cultures of an organisation, group or team, will in turn help leaders of a change process better understand the resistance towards the change itself, and provide a more realistic approach on how to manage it.

The implementation of TQM needs to change the way in which employees behave at work. In this sense, since the entire workforce is responsible for quality, the organizational culture should change towards a climate where employee trust, commitment and participation effectively increase (Kufidu & Vouzas 1998). Therefore, human resource management activities should be carefully designed to shape employees' quality-oriented attitudes.

6.0 THE ROLES OF LEADERSHIP AND HUMAN RESOURCE MANAGEMENT IN DEVELOPING A QUALITY CULTURE

TQM is a management approach, which every one in the organization is involved. In other words TQM is a very people oriented. A review of literature indicates that the leadership and human resource management (HRM) is a major factors that affect the excellence of TQM and its lay a particular emphasis on the needs to change the culture.

Executive leadership is regarded as a driving force for the successful implementation of TQM. Equally emphasized is the requirement of employee involvement and teamwork to weave various interdisciplinary efforts into an integrative system. According to this contention, TQM clearly recognizes the importance of effective leadership and the development and management of human resources (Wilkinson 1992, Flynn *et al.* 1994). Hence, numerous authors recommended leadership and human resource practices that theoretically best shape a quality culture (Rahman 2002, Wilkinson *et al.* 1998). Leadership and HRM can reinforce human relationships and group consciousness, raise employee competence, provide positive job attitudes, create conducive work culture and achieve culture change (Rahman 2002, Yang 2006). Therefore, it acts as the catalyst for the implementation of TQM.

6.1. Leadership

Leadership and top management commitment has been identified as one of the major determinants of successful TQM implementation. Stahl (1999) makes the point that leadership is especially important in total quality organizations because TQM involves dramatic change to a new and improved way of doing business and managing operations. It takes influential leaders to cause followers to change. Therefore, most quality experts agree that a strong leadership from top management is critical in developing and sustaining a quality-based culture in an organization (Rahman 2002). Juran (1974) for example state that most of the problems associated with quality are attributed to

management. This indicates that successful quality management is highly dependent on the level of top management commitment. This requires that top management commitment to quality must convey the philosophy that quality will receive a higher priority over cost or schedule, and that on the long run, consistent and superior quality will lead to improvement in cost and delivery performance. Deming also considered quality responsibility is of the top management. Atkinson (1990) points out that 80 percent of TQM failures are mainly attributed to a lack of requisite commitment of top management. Hence, without clear and consistent quality leadership, quality cannot hope to succeed (Everett 2002, Buch *et al*. 2002).

TQM requires increased effort from everyone in the company to satisfy the customer continuously (McAdam *et al.* 2002). This requires that quality leadership to be made a strategic objective (Feigenbaum 1991). This means that the leader provides the suitable environment to provide the most comfort to the group members to improve performance and productivity (Leiter *et al.* 2002). Hence, Chapman *et al.* (1991) suggest that top management must be involved in setting strategic directions, provide a visible vision and goals, and support behaviour which are consistent with its values and which encourage achievement of organisational objectives. Indeed, Samson & Terziovski (1993) concluded that top management has a major role to play in implementing the TQM program, by being totally committed in leading the culture change process during every stage of implementation process and particularly at the start.

According to Schmidt & Finnigan (1992), there are twelve behaviors that successful quality leaders demonstrate which support a TQM based culture. They were considered as the dimensions of the leadership behavior. These dimensions are: giving priority attention to the needs of external and internal customers; they empower rather than control; they emphasize improvement rather than maintenance; they emphasize prevention rather than correction; they encourage collaboration rather than competition; they train and coach rather than direct and supervise; they learn from problems; they continually try to improve communications; they continually demonstrate their commitment to quality; they establish organizational systems to support the quality effort and they encourage and recognize team effort.

6.2. Human Resource Management

Moving from business as usual to a Total Quality Management (TQM) culture demands much from an organization. Several academics and practitioners have asserted that

synergy and congruence among HRM practices have significant effects on the implementation of TQM. Hence, HRM practices in TQM organizations must be congruent with a corporate culture built on the shared assumptions of employee dedication to quality and customer service. Deming (1986) for example, stress the important of human resource dimension in the achievement of total quality in the organisation. According to Hubiak & O'Donnel (1996) experience show that one of the main issues of a high failure rate in the implementation of TQM is that organisation devote relatively little attention to human resource management (HRM) and considerations of personal relations.

TQM is a holistic concept, and requires the involvement of all members of an organisation to seek customer satisfaction. Organisation must develop and realize the full potential of their workforce and maintain an environment conducive to full participation, personal and organizational growth. This can be achieved through creating the appropriate human resource development through training, employee participation and involvement, building quality awareness among employees, and motivating employees. Successful cultural change requires modification of human resource strategies to support total quality management.

Therefore, for a TQM program to be successful, traditional human resource policies conceived in command and control cultures have to give way to new human resource policies supportive of cultures characterised by employee commitment, co-operation and communication (Blackburn & Rosen 1993). Policies with respect to communication, job design, conditions of employment, training, evaluation systems, and reward systems must be congruent with TQM. Human resource practices also must evolve from a narrow personnel function to a broad leadership function (Partlow 1996) to be able to serve the new needs that arise from a TQM program.

Partlow (1996) has identified ten human resource functions that support a TQM based culture. The functions include: Communications; Employee Involvement; Job Design; Training and Development; Performance Appraisal; Reward and Recognition; Employee Welfare; Recruitment, Selection, Promotion and Career Development; Quality Measurement Tools; and Human Resource in relation to other departments.

Furthermore, organization also should provide a work environment which is conducive to maximising potential of their employees and recognise well-being as a critical component of organisational success. As employees are key stakeholders of any organization, their health, safety and well-being are important factors in the work environment.

6.3. Framework for Quality Culture Development in Construction Firms

The changes in perception toward quality management have opened a new outlook to war quality. More emphasis is being put on ensuring everyone understands the importance of quality and changing the attitudes and behaviour is the most challenging task. Quality is not only the manager's responsibility but it is a collective responsibility.

Figure 1 shows the framework of quality culture development in construction firms.

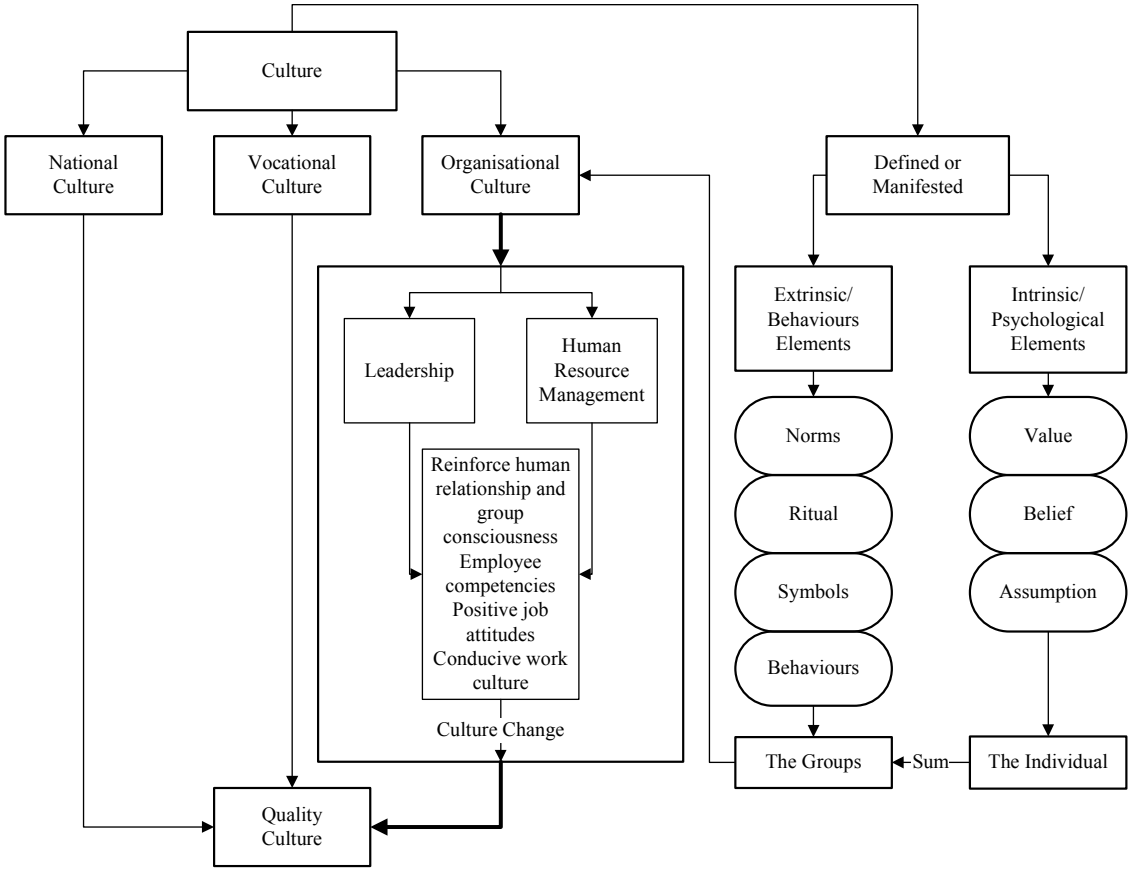

Figure 1: Framework for Quality Culture Development in Construction Firm.

The development of quality culture based on the framework views the overall individual to group responsibility that develops the total value of quality culture which supports the organisational culture. Everyone must play their part in the organisational culture to ensure correct understanding of the importance of quality and changing the attitude and behaviour through the instrinsic and extrinsic element of the culture. Organisational culture will be transmitted to all organisation activities which involve intrinsic and extrinsic elements of the organisation. This will in turn be transmitted to every member in the organisation. All intrinsic and extrinsic elements of culture will

affect the organisation culture throughout the development of quality culture. Consequently, it makes the concept of quality culture more acceptable with expected wider attention. It does not mean that the quality system nowadays is not relevant for practices, but this system will function well when the organisation has developed quality culture. The reason can be seen from different aspects: the existence of barrier in quality system which may be less if the organisation can develop strong quality culture.

The development of this framework will employ a triangulated methodology. Preliminary interview with experts are been conducted with the aim of identifying the key factors and their importance in developing a quality culture in construction firms. An industry wide questionnaire survey will then be undertaken to measure and test the proposed relationships among the key constructs outlined in the framework above and finally the validation of the framework will be done through the workshop discussion with the expert panel.

7.0 CONCLUSION

The construction industry has numerous problems in getting quality performance as a result of the complicated nature of the industry. TQM is being increasingly applied to the construction company to solve quality problem. The implementation of a TQM required a culture change and change in management behaviour. The organizations need to shift from their current culture to a TQM culture that focuses on quality as a key strategy.

A review of literature identifies thirteen important culture dimensions that contribute to successful implementation of TQM. Most of these dimensions are related to leadership and human resource management (HRM). Therefore, leadership and human resource practices will theoretically best shape a quality culture. Effective leadership and HRM can reinforce human relationships and group consciousness, raise employee competence, provide positive job attitudes, create conducive work culture and achieve culture change. Hence, it acts as the catalyst for the implementation of TQM. Indeed its should be adopted by the construction organization in implementing TQM for continuous improvement.

Initial investigations also concur that the implementation of TQM is influenced by organisational, vocational and national cultures. However, the organisational culture has stronger influence than national and vocational culture. The review shows that TQM is embedded in a culture that may or may not be consistent with the organisational, vocational or national culture. Where inconsistency is the case, conflicts arise. The

proposed framework could serve as a model for developing a quality culture in construction firms through leadership and HRM, so that construction firms can use them creatively in order to minimised inconsistencies and conflicts. Hence, these will enhance culture of quality for their continuous performance improvement and competitiveness.

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