

Total Quality Management for Sustainable Development: A Case of the Nigerian Environment

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Abstract

The research work attempts to establish a strategic tool for the implementation of Total Quality Management for Sustainable Development in the Nigerian Environment. The study further sought to address the reasons why Total Quality Management implementation would be of immense benefit to environmental sustainability as well as how to sustain an environment that meets today's needs without compromising the needs of the future generation. In achieving the objectives, a survey comprising a sample of 122 respondents using structured questionnaires was conducted using the Federal Environmental Protection Agency in Nigeria as case study. The questionnaire sought the respondent's views on the implementation of Total Quality Management for Sustainable Development. The data for the study were analyzed using descriptive statistical tools like frequency, pie chart and bar chart. Furthermore, the findings of the research revealed that the Federal Environmental Protection Agency has been in operation all this while but lacks the plan to implement Total Quality Management and quality related policies for purposes of achieving Sustainable Development. Finally, the research articulated the efforts of the Federal Environmental Protection Agency in striving to achieve a sustainable environment; hence the study concluded that the Deming's Plan Do Check Act (PDCA) and Define Measure Analyse Improve Control (DMAIC) Six-Sigma should be inculcated in their strategic plans for purposes of achieving sustainable development.

Keywords: Quality Management (QM), Total Quality Management (TQM), Quality Control (QC), Quality Assurance (QA), Inspection, Development Processes, Sustainable Development (SD),

INTRODUCTION

Total Quality Management (TQM) is a concept designed to continuously improve the processes of an organisation as part of the management's system (Amsden, Butler and Amsden 1998). is a method by which management and employees can become involved in the continuous improvement of the production of goods and services. A compendium of quality and management tools aimed at increasing business and reducing losses due to wasteful practices Manjunath and Kumar, (2013). TQM lays emphasis on continuous improvement of coordinating work processes which allows organizational units to meet their customer's expectations. It connects all aspects of an organisation with a view to focusing on total quality; aiming at reducing waste and cost of labour with increasing production efficiency (Oakland 2003). In a similar vein, Sustainable Development (SD) according to World

Commission on Environment and Development (WCED) report (1987) referred to as Brundtland Commission Report defined Sustainable Development as "development that meets the present need without compromising the ability of the future generations meeting their needs". In terms of sustainability irrespective of the moral, commercial, political or legal perspective are the main driving forces of SD in justifying how organisations could improve their performance.

In Nigerian, the Federal Environmental Protection Agency (FEPA) gave a picture of the shortcomings of an organisation in their resolve to achieve sustainable development at the expense of quality. Management of any organisation should bear it in mind, that they are the custodian of quality improvement by stating their policy and strategy; with the definition of their vision and mission statement (Dahlgard, Kristensen and Kanji 2005). Establishment of foreign policies and decrees in

environment to reduce pollution and other environmental degradation has given rise to intense competition, hence the need to look internally into the operational procedures and change strategically to meet up with the global environmental challenges that has become a necessity (Smith 1998).

Looking at the present condition of Nigeria's environment as a major producer of oil & gas. Urbanization and Industrialization in Nigeria have caused series of problems in terms of waste management with a resultant widespread of water, air and land pollution. Open burning, Oil spills, automobile discharge, disposing of waste, natural gas flaring, and unsuitable erection of rubbish dumps together contribute to critical environmental damage (Anago 2002). Based on these environmental factors, the quest for TQM to eradicate these ills becomes handy by playing a vital role in sustainable development of Nigeria's environment for continuous improvement as well as thinking of what it will become of it in the nearest future if a drastic measure is not taken into consideration.

It is of utmost importance noting the fact that a nation cannot withstand sustainable development without continuous improvement of its environment.

Nigeria as a nation is facing serious challenges on how to address the issue of environmental sustainability. Looking from the general perspective of sustainability, it comprises the social, economic, and environmental issues that have direct impact on man and the natural habitats. From corporate view, it has been generalised that sustainability is all about protecting the environment.

To be precise, the Nigerian environment has deteriorated to the point where one wonders if government policies are still effective in operation, ranging from the economic, environmental and social perspectives. The Nigeria economy has reached a stage where its manufacturing, allocation and utilization of goods and services are no longer managed accordingly to sustain the society. This has led to so many vices both on the side of the youths and other classes of the citizens. It is a painful situation seeing a nation like Nigeria which is endowed with abundant natural resources is still crawling with dilapidated structures, lack of good road, unequipped hospital, no institutional facilities for both schools and agricultural processes which are meant to be the route for sustainable development. Hence, the need for TQM in SD to minimize the waste generated by these activities has become paramount.

QUALITY MANAGEMENT (QM)

The concept of quality management incorporates the integration of strategies, goals and objectives in planning and implementation; through the application of control

OBJECTIVE OF THE STUDY

The objective of this study include:

1. To identify the process of achieving Sustainable Development (SD) through Total Quality Management (TQM).
2. To evaluate the role of Total Quality Management in the enhancement of the Environment.

RESEARCH QUESTION

This study will address the following questions as it affects the TQM for SD in the Nigerian environment.

1. By what process can Total Quality Management (TQM) influence SD?
2. What role does TQM play in enhancing the environment?

In an attempt to provide a lasting solution to these questions as it concern sustainable development of the environment, different methods will be sought at, as details will be provided.

Quality according to Mehta (2004) is the meeting or exceeding of the customer's needs and expectations either in services or product. Garvin (1987) defined quality using eight dimensions: performance, feature, reliability, conformance, durability, serviceability, aesthetics and perceived quality. Significantly, quality means different thing to different people for a specific purpose which must be satisfied. There are several definitions of quality based on the perception of the author which must meet a specified standard at any given time. According to Crosby, (1979) cited in Williams and Buswell (2003) quality is the "conformance to requirements" or specifications; stressing that management should measure quality adequately. Quality may be seen as being efficient if only management strives to achieve quality and the customer's expectations are met; and inefficient if management fails to provide adequate training to update the level of performance of their workers. According to Azhar , Naz, Gul, and Nawaz (2013) quality means creativity and for it to be considered creative, the product, service or idea atleast should be different from what it used to be and it must also be capable of achieving its goal and objectives.

systems to check and monitor feedback. Charantimath (2011) suggested ways of implementing organisation's quality management: customer's Satisfaction and improve business efficiency. Above all how to eliminate error "zero defect" should be a major goal of quality

management. As argued by Dale and Robinson (1996) QM is implemented in the environment to minimise waste generation through the 3Rs – reduce, reuse, and recycle representing the hierarchical approach as used in industrial ecological practice to sustain the environment for being polluted. Its application to the environment in product development and strategic analysis, provides an opportunity for management to allocate responsibilities and have options in aspects of material management in this order: Raw material used, Products consumed, Substances emitted and Waste recycled (Dale and Robinson 1996). Dale and Lascelles (1997) summarised the techniques and philosophies of quality management as “quality journey”. The emergence of total quality had been deliberated and traced to four evolutionary stages: quality control (QC), quality assurance (QA), quality inspection (QI) and total quality management (TQM).

Quality Control (QC)

Conventionally, quality control is used to manage quality of a business or organisation. Quality control as defined by (Juran and Gryna 1988) is a monitoring process through which organisations assess their quality performance, with reference to established standards, to enable them work on the difference. QC is a powerful management tool which targets to prevent goods and services not conforming to the standard requirements from reaching out to the end users /consumers. Owing to the difficulties related to QC, organisations focus on other ways of managing quality effectively. According to Dale, Boaden and, Lascelles (1994), they argued that the non-conformance issues should be addressed during planning stage for effective elimination and minimisation of waste accumulation. Implementation of QC requires an effective policy of SD in all aspects of the business environment leading to waste minimisation.

Quality Assurance (QA)

This is an aspect of business process designed principally to minimise the occurrence of producing substandard goods or products (Atkinson 1995). QA is a prevention based system, improving the quality of the product and service, contributing to production enhancement placing importance in the design of the product, service and processes. The philosophy of QA (Kelada 1996) hold forth to quality created in the design stage as a result of that preventing problem that may arise during control stage since problems of quality are caused due to poor process design. For QA to be effective, it must be proactive rather than reactive following an operating philosophical approach that will motivate individual and incorporate all sections of an organisation. A good application of QA leads to successful development of integrating regulatory and

sustainability assessment together with better agenda for SD (George and Kirkpatrick 2007).

Quality Inspection

This is an activity that involves measuring, testing, examining and evaluating the performance of a product or service to determine if the characteristics of that product or service meet its specified requirement or conformity (Charantimath 2011). Defects in products and services are detected through efficient and effective inspection (Pfohl and Shen 2008). Inspection aims at detecting defects after production is ineffective and costly; and quality of product and service should be done through process improvement than inspection after production, Stockmann (2008) argued that the concept of SD when inspected gives another view for improvement. Stressing that inspection is all about actualising the aim of the world earth summit held in *Rio in 1992 with the motto: “think globally, act locally”* all expressing action for SD.

TOTAL QUALITY MANAGEMENT AND ITS PRINCIPLES

TQM can be said to be a structure instituted to re-focus and guide the organisation’s behaviour (Morfaw 2009), it’s planning and working procedure which embraces a culture that energise the employee’s commitment, giving solution to problem, involve the stakeholder, and hold values and integrity in high esteem. In a holistic form, TQM harmonises SD by balancing the differences between the present and future, long-term and short-term, individual and collective, global and local, private and public, and also optimism and caution (Verma 1998). Holzer and Lee (2005) argued that TQM is a way of developing strategies to enhance products improvement, processes, and services continuously; which include the following functions as the key to development: Top management commitment, Customer focus, Continuous improvement, Teamwork, Participate management, Labour management cooperation and Systematic analysis.

TQM as a management system targets to improve the flexibility of a business, giving it an effective, efficient and competitive edge. It is also a way by which waste is removed, linking everyone to partake in improving the process of doing things (Ho and Fung, 1994). As stated by Bender and Krasnick (1993) TQM is not totally a management technique but a philosophy applied by management aiming at improving the value of satisfaction a customer derives from a product or service by integrating quality into processes or systems. TQM based on the philosophical application in implementing the goals and objective of the organisation may be

referred to as: Continuous Quality Improvement (CQI), Total Quality Control (TQC), Integrated Quality Management (IQM), Total Quality Leadership (TQL), Industrial Quality Management (IQM), Quality Management Science (QMS), Configuration Management (CM) or Environmental Quality Management (EQM) (Morfaw, 2009)

The key success in managing the environment for sustainable development is maintaining the facilities available and the ability to forecast the future trends positively and incorporate them into the strategy for TQM. The efficiency of any organisation implementing effective TQM depends on its approach and knowledge of the basic principles of TQM. Some of these principles are being discussed briefly as follows:

Leadership And Senior Management's Commitment

Leadership may be seen as a common term, but it goes far beyond that, as it requires some essential qualities for one to be grouped among the leaders. Leadership is a way of doing the right things as against management which is doing things right (Suganthi and Samuel 2004). In the same view, Oakland (2003) concluded that the success of an organisation lies with the top management; therefore they should be committed to promote the business objectives of the organisation effectively. Wallace (2005) listed some factors that top management and leaders of business organisation should focus using TQM for SD: Senior-level officials to coordinate the vision and strategic matter regarding SD, Management to develop strategic plans to implement SD programs, Prepare and present a report which will analyse, assess and cover SD policies and Practise a design and implementation plan that will promote sustainability.

Change Of Culture

The principle of TQM works with a change in culture, which is not easily achieved immediately but takes time to implement. It demands a change in individual's and organisational attitudes and the methods of work. Cultural change in TQM is a global philosophy as it aims at producing quality goods and services within the organisation (Kanji 1995). He further stressed that "quality revolution" are based on beliefs, causing not less than 85% of all problems generated in the system; both management and the entire business organisation and not focusing on putting technology in place. Hooper (2005) observed the necessity of culture and SD with TQM as this is essential and remains a dynamic process and important in sustainability of the future globally.

Customer Focus

One of the ideologies of TQM centres on satisfying the customer's need. Andrie (1994) argued that meeting the customer's expectation and long-term relationships are the sole responsibility of the business organisation. Building a good Customer focus should be one of the strategic principles of TQM which an organisation is required to develop along with the operational processes committed to meet customer's expectation (Juran & Godfrey 1999).

Training

TQM training is a process of developing the skills required in implementing an organisation's quality plan. It is a strategy adopted in organising and implementing the organisation QM initiative (Juwon and Barnard 1993). Training as an element of TQM is an important aspect of the organisation as it demands an effective participation of all sectors of the organisation. As argued by Fien, Maclean and Park (2009) SD could be achieved through promotion of training and awareness campaign with educational re-orientation, encouraging the necessary public for a successful TQM for SD.

Team Work

This is another aspect of implementing TQM in an organisation, it involves the building of trust, developing of independence and improvement of communication links within the organisation. It is of great benefits in implementing TQM at all level and provides a very good platform to build a TQM culture. Achieving sustainability demands an effective team working as it enhances performance and quality improvement for SD (Blandford 2000).

Continuous Improvement

Continuous improvement is one of the strategic focus of TQM as it places the method of measuring and controlling its activities which is geared towards achieving customer's requirements (Weijermars 2011). It is a process that tends to improve business perfection and increase competitive advantage (Goetsch and Davis 2006) and it is an on-going process. Continuous improvement identifies and reduces the waste generated in the process or system targeting to achieve SD through continuous social, economic and environmental improvement (Nejati and Nejati 2010).

Total Involvement

According to Al-Dabal (2001) total involvement is the final element when considering the principle of TQM. It involves the participation of everyone in the organisation. Total involvement for TQM and SD is commitment that encompasses the values of envisioning

a mission, prioritising tasks, seeking continuous training with a sustaining motivation and effective communication across all levels of the organisation geared towards achieving a goal (Morfaw 2011).

Process

According to (Ewy and Gmitro, 2010) a process is a series of activities or actions resulting to the accomplishment of set of goals as an outcome. They further stated it is a way of achieving a desired result. A process is a medium or activities revolving to deliver the customers requirement, characterised by creating an avenue for customer focus and continuous improvement. Magutu, Mbeche, Nyamwange, Mwove and Ndubai (2010) argued that Quality management (QM), originated from different management practices and process improvement, and can as well be regarded as "Total Quality Management (TQM)" which covers all aspect of the organization. TQM inspect the quality of products and services during processing through the installation stage while also creating a philosophy of doing it right the first time.

QUALITY PRACTICE AND PERFORMANCE

Many organisations today build their strategic foundation on competitive advantage by applying good quality management principles and performance enhancement (Hendricks and Singhal, 1997). This can also be applied in the natural environment for sustainable development by incorporating the basic tool for quality control and quality assurance. Quality awards have been won by several organisations comparing their performance with others (Hendricks & Singhal, 1997) and have achieved an outstanding value which many of the developed nations adopted as competitive edge. Powell (1995) argued that quality practice in a good environment improves the organisational performance; which if applied to the Nigerian environment, sustainable development will be achieved.

QUALITY ATTRIBUTES AND ATTRACTION

According to Lofgren, Witell and Gustafsson (2011) the connection between the theory of attractive quality and attribute as it relates to the objective performance and customer satisfaction lies on customers' evaluation of a certain product. In the same vein, quality attraction predicts the role of different quality attributes which changes during the product life cycle. Nwoko-Omere, (2012)

IMPLEMENTATION OF TQM

To implement TQM process, an organisation is required to adapt to changes from their formal system and processes, because it may pose a challenge to their

organisational culture and climate of operation for a period of time (Luft, 2010). This can be achieved through the effective dimensional tools of TQM like statistical control systems and operational management despite it "thought revolution" (Ishikawa, 1989). TQM implementation calls for effective dedication of the project manager, to coordinate and consult the line managers and board directors (Cheng, Podolsky and Jarvis 1996). It requires the establishment of: Active task force, Effective working and activate schedules, Monitoring and regulatory team, Strong communication strategies, Budget and planning implementation and Conflict resolution team.

DEMING'S PLAN-DO-CHECK-ACT (PDCA)

Sheldon and Yoxon (2006) stated that in order to implement PDCA in the environment, there is need to meet the required standard of "ISO 14001:2004 (the international standard for environmental management system)". The PDCA Cycle presents an easy but valuable approach for solving problems and controlling change, confirming that designs are adequately tested before carrying out a complete implementation. It can be applied in all the areas of the environment even in development of new policies, product, etc. This starts with a Planning stage where the problem is obviously recognized and understood. Possible results are then produced and analysed on a small scale in the "Do" stage, and the conclusion of this analysis is evaluated throughout the Check stage. "Do" and "Check" stages can be repeated as many times as possible until the required result is obtained, the refined solution is put into action in the "Act" stage (Dale, Cooper, and Wilkinson 1997).

SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

The term sustainability is used to link together the difference between the environment and development; and the concept of sustainability investigates the connection relating social, economic and environmental issues (Rogers, Jalal, and Boyd 2008). Fundamentally, sustainability could be seen in two perspectives, the weak sustainability and the strong sustainability (Elkins, Simon, Deutsch, Folke, and Groot, 2003). Initially, emphasis was laid on how to use more of the renewable resources and developing an alternative to non-renewable resources, while maintaining the existing resources by exploring technological solutions to ecological and environmental depletion (Williams and Millington, 2004). The concept of sustainability has dominated all aspect of life today; Clark (2005) stated "Everything is sustainable these days", while many criticisms have arisen due to how this concept are used.

Jones, Daphne, and Hillier, (2011) highlighted that the interest in sustainability has gained weight as many are trying to build up a theoretical framework that will link human's activity with nature, also acknowledging that social and economic development work along side with the natural environment.

The, Brundtland Report (WCED, 1987) defined sustainable development "*as a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*". Today the concept of Sustainable development has gained popularity. Arvind, (2007) argued that sustainability conventionally has three core dimensions: social sustainability, environmental sustainability, and economic sustainability. It is a concept that will demand all aspects of the society because of its multi-dimensional nature.

Putting sustainable development into effect, The UNCED summoned a convention with a theme "*Earth Summit*" held at "*Rio de Janeiro in 1992*", with many principles leading to the achievement of "*sustainable development*"; some of the principles stated according to UNCED (1992) are:

- ✦ Principle 1: "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature".
- ✦ Principle 2: States to take care of their own resource within their environment and ensure the responsibility of not causing damage to others; is a principle that guides to prevent pollution and environmental damage among nations.
- ✦ Principle 3: Emphasize that the right to development presently should jeopardize the future.
- ✦ Principle 4: Integration of environmental protection shall form the basis for development.
- ✦ Principle 7: Consider the corporation of the states to inculcate spirit of global partnership to save the environment.
- ✦ Principle 13: Compel that the "states shall develop national laws regarding liability and compensation for the victims of pollution and other environmental damage".
- ✦ Principle 15: Highlight a precautionary approach to protect the environment from threats.
- ✦ Principle 16: Lay hold on environmental cost, applying the principle of "polluter pays" as an economic instrument.

- ✦ Principle 17: Visualize "environmental impact assessment (EIA), as a national instrument on issues that have adverse effect on the environment.

As a result of this declaration of by the Earth Summit, every nation was guided towards their behaviour on sustainable development. Thus, preserving the environment happens to be a thing of reality globally which FEPA is struggling today to achieve.

ENVIRONMENTAL SUSTAINABILITY

According to Andrew (2009) Environmental sustainability is a sensible way of using our limited natural resources to avoid degeneration and degradation for the upcoming generation. The environment as such is suffering from fundamental changes. According to Connor and Dovers (2004) the purpose and aim of environment and Sustainability is to integrate policies capable of treating social, economic and environment together without isolation. As Razzaque (2002) stated, the concept remains undistinguishable. It is unbelievable and overwhelming on decades ago that activities have been centred on domestic and global concern on the incoming danger of environmental degradation, desertification, deforestation, ozone and resource depletion, toxic waste, habitat loss and global warning all contributing to the problem facing the planet earth today (UNCED 1992). There are several reasons for applying TQM to achieve environmental sustainability. These include:

- ❖ Increase in demand for suitable, effective and efficient environmental sustainability as the environment is deteriorating,
- ❖ There is need to reduce variations in the standard that increase the cost of services in the environment,
- ❖ Reduction of increasing environmental waste,
- ❖ Control the pressure from markets, and research and development.

To be precise, the environment is the major element that influences the nature, which are natural or physical, temporary or man-made, biological and chemical elements that compose the way of life, changes and improvement of living organisms feasible. The ecosystem comprises important elements in the environment; hence they follow the laws of natural resources. The introduction of the environmental laws (quality control and quality assurance) came up as the need to preserve the environment arose; protecting it from devastation and, likewise, rescue sufficient life from being endangered to risks or hazardous environments (Rostron and Jackson, 2001).

ENVIRONMENTAL MANAGEMENT FRAMEWORK

Spitzer (1999) highlighted that modern quality framework in environmental systems and sustainable development gained more popularity in few decades ago. Quality, QC, QA, and TQM have gained important attention to environmental sustainability. A well organised and continuous improvement of quality in environment and SD has been the concern of environmental management (Sheate 2010). Quality within the environment and SD remains a challenging issue. The role of TQM for SD programs and standards for enhancement of performance excellence in environmental sustainability is progressing. Presently people are longing for the best quality which has affected environmental sustainability all over the nation; improving a methodology which can provide the customers with the quality they require.

ENVIRONMENTAL IMPACT ASSESSMENTS (EIA)

This a methodology or process carried out to identify, predict, evaluate and mitigate the impact of an existing or proposed project or business on the environment in all dimension, be it physical, biological, chemical, social and economic effect as it affects the natural resources (Shepard 2005).

ENVIRONMENTAL PROBLEMS HINDERING SUSTAINABLE DEVELOPMENT

Urbanisation

This is a process by which people migrate from the rural area to urban area; it is also a process of transforming a rural area into an urban city (Wang 1999). Baird (2009) argued on the environmental consequences that will arise as a result of urbanisation in the nearest future using the United State, he stressed that urbanisation will take place within the coastal or marine regions; secondly, he pointed out that population and the recent urbanisation are drifting closer to the coastal regions leading to over exploration of resources.

Desertification

A desert is a process of a land becoming unproductive, no trees or vegetation, mostly covered with sand and above all without water as it is with some of the African countries found within the Sahara desert. Desertification could be natural through the process of drought or wind action or by man through his activities on the environment (Omofonmwan, and Osa-Edoh, 2008). Desertification is one of the global environmental problems facing international communities. According to Liotta, Mouat, Kepner, and Lancaster (2008), land degradation due to improper ploughing or over-

cultivation, overgrazing, using of rangeland for cropland within the marginal areas having low range of rainfall and the wide spread of urban and rural settlement all contributed to desertification.

RESEARCH METHODOLOGY

Both Primary and Secondary data were used for this research for effective and efficient utilization of the method been adopted through questionnaire. Primary data were gathered through questionnaires issued to the staff of Federal Environmental Protection Agency (FEPA) of Nigeria; to sample their opinions on the implementation of Total Quality Management (TQM) for Sustainable Development of the Nigeria environment. The questionnaire started with an enquiry, testing their knowledge on TQM, and SD. Then, the main questionnaire followed which comprised of 22 questions, where 21 questions had options 5 – 1 usually a *close-ended question* whereas the last question (an open ended question demanding their personal opinion of what they think about the subject matter). The instrument used a five-point Likert scale reflecting a range of attitude from strongly agree to the strongly disagree. The coding of the Likert scale was made as [5 = strongly agree], [4 = agree], [3 = neither agree nor disagree], [2 = disagree], and [1] = strongly disagree]. A total of 150 questionnaires were sent out to FEPA, of which 127 of the questionnaires were retrieved and 5 out of the 127 were rejected due to cancellation and omissions in completing some of the questions. Hence 122 were used for the analysis which comprises of 49 females and 73 males respondents. Secondary data were also used in the form of published works; Internet, Libraries, Books and Journals.

In the cause of this research both qualitative and quantitative research methods were used to draw conclusions. The reliability of the primary data was subject to the degree of confidence to which the results obtained through the research method. Likewise the validity of the primary data is the degree of extent to which the method used to assess or evaluate the data in yielding the desire result. This accounted for both 'internal' and 'external' validity. The internal validity verifies if the theory used generated the desired result of the research, while the external validity confirms if the results generated in the research can be generalised. The data sampled were statistically analysed using charts, percentages etc to validate the results. Thereafter the DMAIC Six-Sigma tools process as well as the Deming's Plan-Do-Check-Act (PDCA) with other TQM tools (benchmarking) to ascertain sustainable development and management implementation in FEPA operating system.

DISCUSSION OF RESULTS

The analysis of the data generated from the questionnaire where grouped into three as follows:

- ❖ Questions 1,2,3 were grouped together for analysis, which will attempt to address research question 1.
- ❖ Questions 4 and 5 were also grouped together for analysis focusing to answer research question 2 and

The grouping of these questions is to help the research address the research questions which in turn will be used to develop strategies for the research objectives.

Analysis of Question 1, 2 and 3

The respondents result of Questions 1,2 and 3 proved that the agency has heard of TQM and SD, which is quite interesting but how to implement it is the challenges they are facing. Table 1 presents the questions and the response of Questions 1 – 3, this result is analysed in Table 2 in percentage of the individual and in general for further analysis and inference.

TABLE 1: RESPONDENTS RESULT OF QUESTION 1, 2 AND 3

S/N	QUESTIONS	5	4	3	2	1	Total Response
1	TQM processes influences SD.	82	32	5	3	-	122
2	TQM improves the management’s performance for sustainability.	102	19	-	-	-	121
3	TQM for SD plays a role in establishing of quality policies.	97	20	3	2	-	122
	Total	542	157	21	11	0	731

TABLE 2: ANALYSIS OF Q 1 – Q3 RESPONDENTS RESULT IN PERCENTAGE

Question No.	Strongly Agree (%)	Agree (%)	Likely (%)	Disagree (%)	Strongly Disagree (%)	Total Percentage (%)
1	67	26	4	3	0	100
2	84	16	0	0	0	100
3	80	16	3	1	0	100
Total	74	21	3	2	0	100

From table .2, respondents result in percentage shows that in Q1: 67% of the respondents strongly agree, 26% agree, 4% likely and 3% disagree, which shows that *TQM process will influence SD* as 114 out of the 122 respondents are in agreement with the question. For Q2 *TQM improves the management’s performance for sustainability* has 84% strongly agreeing as no respondent answered likely or disagreed. This proves that TQM is a vital tool for SD and performance improvement. Next is Q3 where 80% of the respondents strongly agreed, 16% agreed, 3% likely and 1% disagreed, giving the conclusion that *TQM for SD plays a role in establishing of quality policies* 2 out of 122 respondents disagreed leaving 120 in agreement. Hence, in general taking the cumulative result of Q1,Q2, Q3, 74% of the respondents strongly agreed

that TQM will influence SD, 21% agreed which also supported the ideology, while 3% are likely to agree or disagree, and 2% disagreed which is minimal compared to the overall population. The graphical representations of these analyses are shown in figures 1 and 2.

FIGURE .1: GRAPHICAL REPRESENTATION OF QUESTIONS 1 – 3

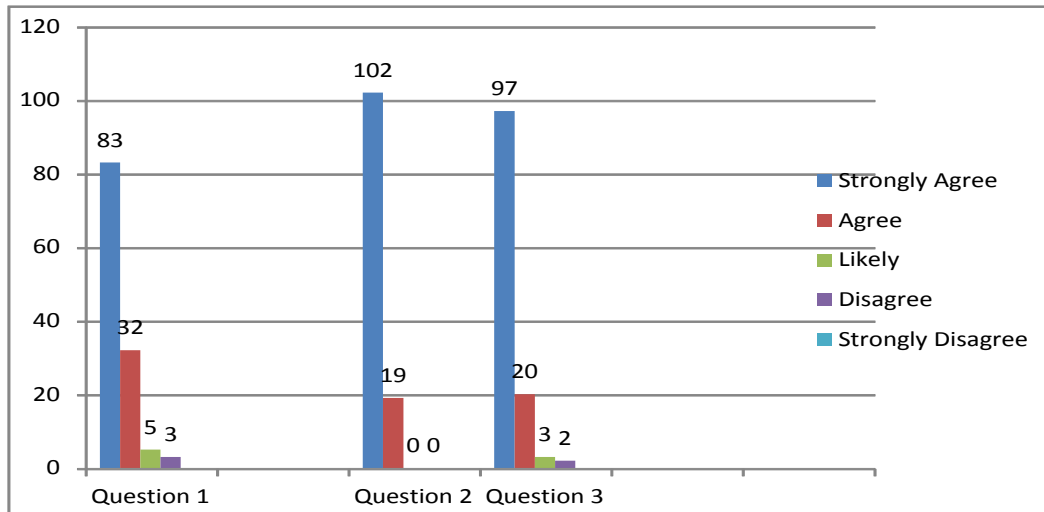
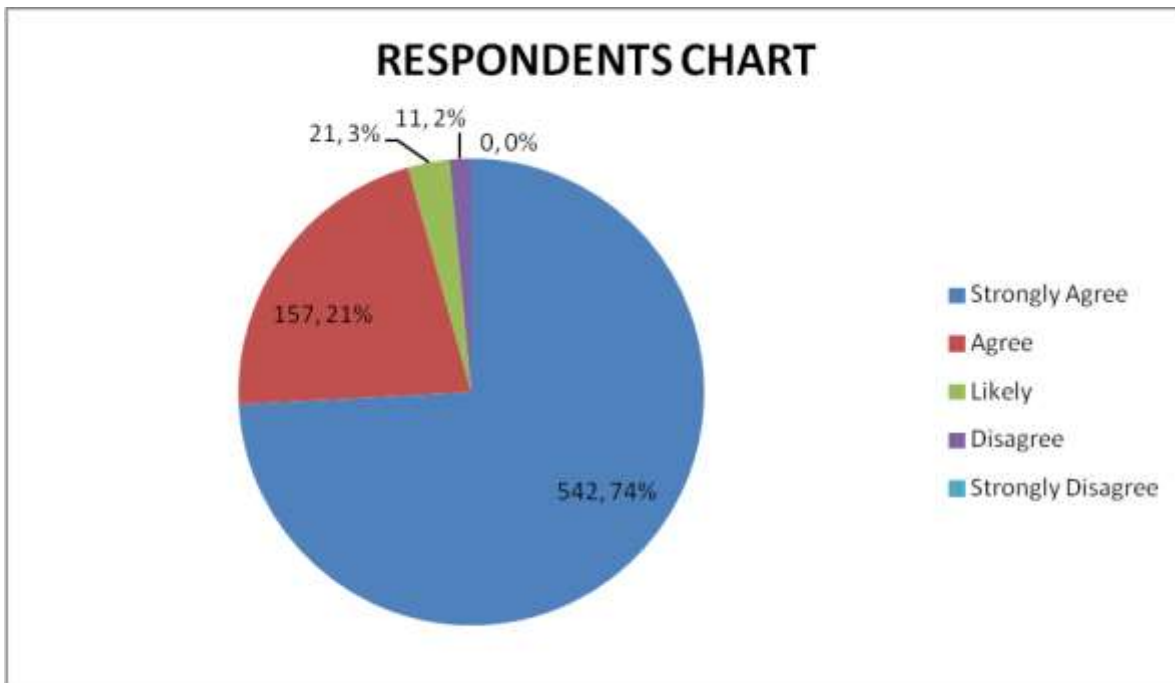


FIGURE 2: REPRESENTATION OF TOTAL PERCENTAGE OF RESPONDENT’S CHART FOR Q1,Q2,Q3



The graphical representation of Q1 – Q3 as shown in figures 1 and 2 proved that TQM implementation will influence SD.

Analysis of Questions 4 – 5

The respondent’s response for Questions 4 – 5 confirmed that the agency agreed that TQM and SD work together. Table 3 presents the questions and the response of Q4 – 5, and the result is analysed in Table 4 in percentage of the individual and in general for further analysis and inference.

TABLE 3: RESPONDENT’S RESULT OF QUESTION 4 AND 5

S/N	QUESTIONS	5	4	3	2	1	Total Response
4	TQM practices leads to development and waste minimisation for SD.	84	36	2	-	-	122
5	Introduction of TQM aided SD in the environment.	104	10	5	3	-	122
	Total	608	98	20	6		732

TABLE 4: RESPONDENT’S RESULT OF QUESTIONS 4 AND 5

Question No.	Strong Agree (%)	Agree (%)	Likely (%)	Disagree (%)	Strongly Disagree (%)	Total Percentage (%)
4	69	30	1	0	0	100
5	85	8	4	3	0	100
Total	83	13	3	1	0	100

Q4, states that *TQM practices leads to development and waste minimisation for SD*; 69% of the respondents strongly agreed, 30% agreed, 1% likely and none disagreed; this means all the respondents agree that waste minimisation promotes SD. Also, in Q5 *Introduction of TQM aided SD in the environment*; have 85% of the respondents strongly agreeing, 8% agreed, 4% likely and 3% disagreed. This shows that TQM introduction will facilitate SD as well as reduce waste generation. Whereas, total cumulative result of Q4 – Q5, shows that 83% respondents strongly agreed that TQM will contribute to WM ,13% agreed, while 3% probably are in either agree nor disagreed and 1% disagreed which is negligibly compared to the total population. The graphical representations of these analyses are shown in figures 3 and 4.

FIGURE 3: GRAPHICAL REPRESENTATION OF Q4-5

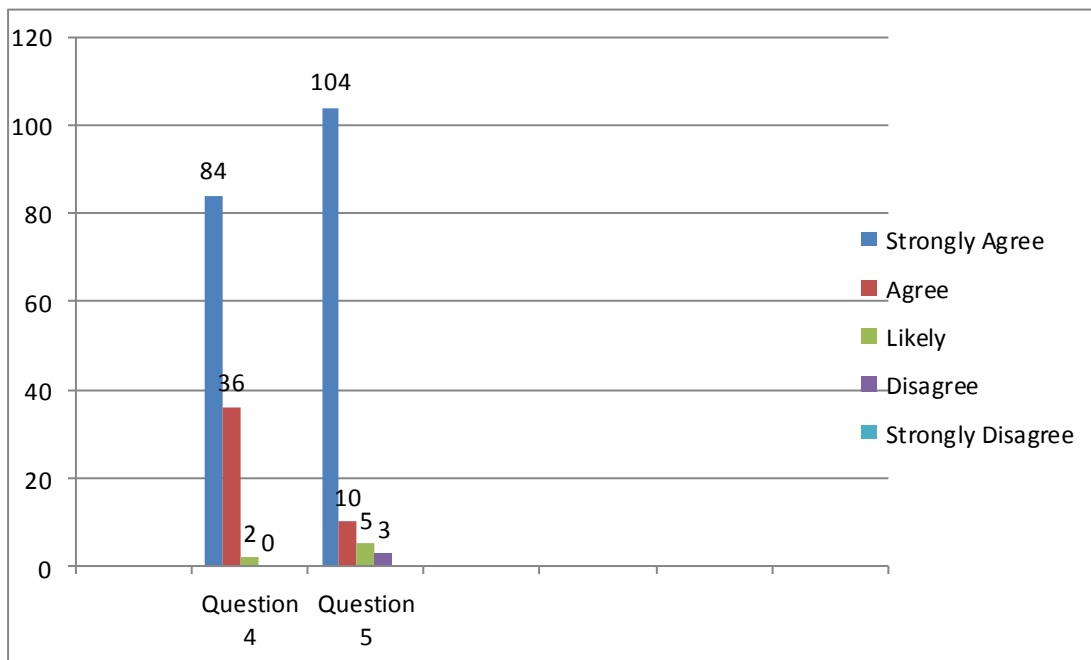
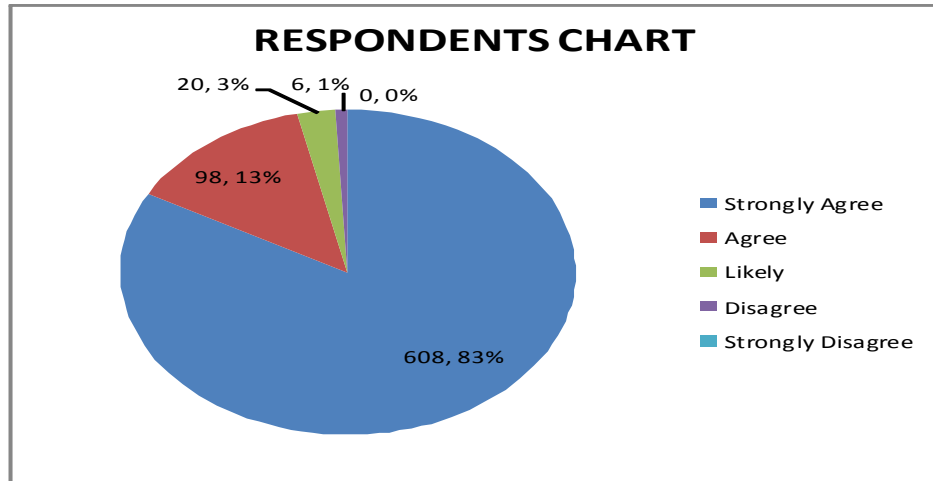


Figure 4:



REPRESENTATION OF TOTAL PERCENTAGE OF CHART FOR Q4 and Q5

These graphs represent the analysis of Q4 – Q5 showing the extent TQM implementation contributes to sustainable development.

Analysis of Questions 6 – 7

The respondents’ result of Q6 – Q7 is evident that the agency is familiar with TQM, SD and cleaner production; but is faced with the problem of how to achieve it to mitigate the damage caused in the environment.

TABLE 5: RESPONDENT’S RESULT ON QUESTIONS 6 & 7

S/N	QUESTIONS	5	4	3	2	1	Total Response
6	Training and educating the employees secures quality improvement.	80	38	3	1	-	122
7	Incorporation of TQM helps in decentralising decision making and promotion of SD.	82	37	1	-	-	120
	Total	761	189	13	9		972

Table .6 Respondent’s Result on Questions 6 & 7

TABLE 1: RESPONDENT’S RESULT OF QUESTION 6 & 7

Question No.	Strong Agree	Agree	Likely	Disagree	Strongly Disagree	Total Percentage
6	65	31	3	1	0	100
7	68	31	1	0	0	100
Total	78	20	1	1	0	100

The analyses on table 5; confirms that in question Q6, *Training and educating the employees secures quality improvement* has 65% of the respondents strongly agreeing, 31% agreed, and 3% likely and 1% disagreed, this means that TQM needs to be put in practice for training the workforce. Whereas Q7 *Incorporation of TQM helps in decentralising decision making and promotion of SD* 68% of the respondents strongly agreed, 31% agreed and 1% likely, none disagreed leading to the generalisation that everyone is an instrument for TQM implementation.

The graphical representations of these analyses are show in figures .5 and 6

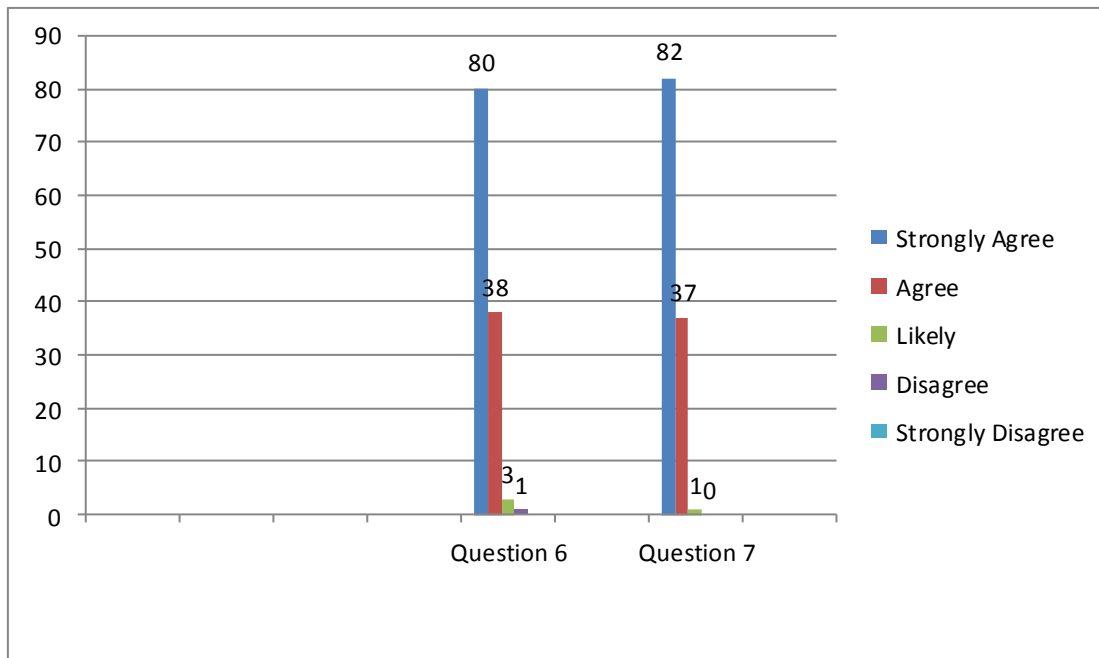
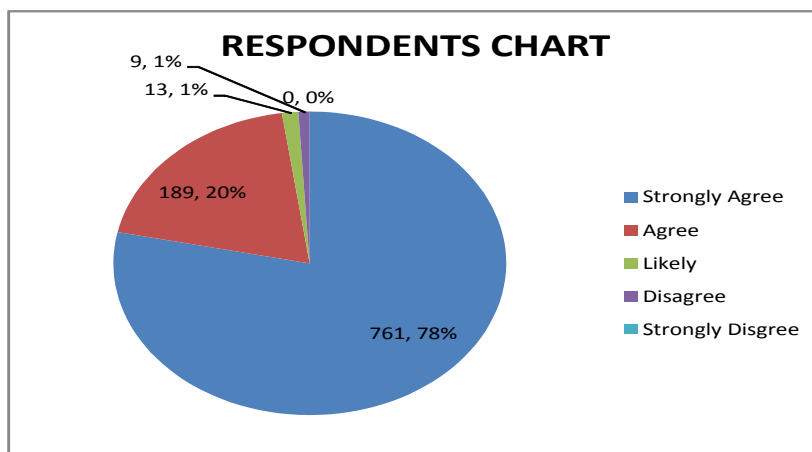


FIGURE 6: REPRESENTATION OF TOTAL PERCENTAGE OF RESPONDENTS CHART FOR Q6 & 7



DISCUSSION OF FINDINGS

Findings From Questions 1,2, and 3

The analysis of Q1 indicates that the staff of FEPA accepted that TQM had a great advantage on SD in Waste Management. They also agreed it can be achieved if proper TQM tools and measures are implemented effectively in their policy and decision making; and also in discharging of their duties or operations effectively.

Likewise Q2 which has the highest percentage of respondents that strongly agreed with 84% indicating that management's performance depends wholly on the level of TQM practice in their managerial functions. Furthermore, the percentage of those who strongly agreed to Q3 shows that SD can only be achieved if there are defined quality policies at their place and work on the environment. This is a direct responsibility on the part of FEPA to establish a functional policy capable of checking the quality of activities going on in their environment.

The establishment of good TQM in the environment will help FEPA carry out their operations smoothly. FEPA in that view should adopt a good management strategy of putting TQM to work, holding on integrity and uprightness in discharging their duties without fear of external forces. Therefore a genuine conclusion could be made from Q1,Q3, and Q4 looking at the percentage of those who strongly agreed which is 74% in table .2; answer the Research Question 1. *By what process can Total Quality Management (TQM) influence SD?* This question had been addressed to some certain extent with the analyses and the view of the respondents. Supporting this conclusion from the analyses TQM for SD can be said to be achieved if:

- ❖ Management knows their position in implementing TQM;
- ❖ Staff are willing to discharge their duty with clear consciousness;
- ❖ Policies on how the organisation is ran is communicated to all the departments;
- ❖ Commitment to stand on the organisation's stated objectives (Vision and Mission Statement) and
- ❖ Focus should be directed on continuous improvement and a sustainable business environment.

Hence TQM will influence SD if it is properly implemented in the environment and a baseline set as a benchmark to check its performance if there is conformance.

Findings From Questions 4 & 5

From the analysis of Q4 there are proves that waste minimisation and quality practise of TQM are the basis for SD. To achieve a sustainable environment Q5 response made it clear that implementing TQM will aid in minimising waste, and its proper management will lead to sound SD.

Thus, Q4 & Q5 helped in contributing to the Research Question 1. *By what process can Total Quality Management (TQM) influence SD?*

Inference from analysing TQM implementation will contribute to WM&M in ascertaining SD when the following are put in place:

- ❖ Development of strategic plan on how to practise good SD;
- ❖ Make TQM policy simple and easy to be adhered to and applied effectively;

Findings From Question 6 & 7

This section of the questionnaire revealed that one of the principles of TQM is training which Q6 deliberated on, FEPA should organise training programs for her staff and awareness campaigns to enlighten the public about safeguarding the environment now and for future generation.

Therefore, considering the respondent's analyses from Q6 & Q7, conclusions can be made to

- ❖ Involve all the sectors as agent of SD through effective TQM implementation.

CONCLUSION AND RECOMMENDATION

The overall focus of this research is targeted at applying the DMAIC six sigma quality tools in organising a sustainable environment and quality practice in the business environment. Based on this fact FEPA should organise its operating processes through proper planning for effective implementation of TQM as follows:

DEFINE (D)

The organisation's objectives should be clearly defined and the design parameters and performance metrics as well. Actualising the object of the research work FEPA should *define* its strategy of implementing TQM for SD.

MEASURE (M)

FEPA having identified the tools in the definition stage should develop how to measure and assess the process performance metric both qualitatively and quantitatively. In order to *Measure* how to achieve the strategy defined, FEPA should establish a device for measuring performance in implementing TQM for SD.

ANALYSE (A)

Baseline data should be established by FEPA and analysed fully for references, taking in account comparison between the identified performance and the goal performance, whereby prioritising the identified opportunities for system improvement, making relevant modification of the design where necessary. FEPA will through the definition and measurement of its strategy *Analyse* if it meets with the incorporation of TQM implementation in achieving SD.

IMPROVE (I)

This stage takes into account organisational processes, parameters or structures that needed adjustment or improvement as well as logical elimination of defects in the processes to reach targeted performance level and continuous improvement. In that view FEPA needs to develop a method to *improve* its performance in order to reach its expectation.

CONTROL (C)

This stage aims at keeping the process at a new level and prevents it from reverting to the formal stage of low performance. It is achieved through controlling the improvement plans, proper documentation, monitoring the implementation process alongside training and incentives program. *Control* is another vital tool important for FEPA to adopt in pursuit of implementing TQM for SD in minimising and management of waste in the environment.

CONCLUSION

The findings of this research have confirmed the benefits that accrue from implementation of TQM for SD. It reveals the importance of strategic tools for an organisation to engage in pursuit of sustaining a competitive advantage. The principles of TQM if well applied brings about improvement and increase in the values of the organisational culture and effectiveness in satisfying conducive environment and enhance profitability.

In the course of this research, the researchers found out the importance of strategic planning and the need to embrace business strategy for both internal and external factors as well as having the best tools for implementing TQM. It further broadens the researchers understanding of the concept of sustainability and the effect it has on businesses or operational environments. Incorporating this strategy gives an advantage in defining the organisational goals which covers its mission and vision statement as well as the principles of TQM geared towards achieving continuous improvement of the environment and effective and efficient implementation.

However, the researchers discovered in the course of the study that previous works done on this concept have some similarities. Literature on TQM implementation revolved within management effectiveness, workers involvement and teamwork, customer focus, critical success factors and above all continuous improvement; whereas SD centred on how to satisfies the present needs without compromising that of the future by addressing the social, economic and the environmental issues. The research through the various tools and principle of TQM has identified how standard specifications are applied in implementing TQM, also in achieving environmental sustainability. The ISO 9000 & 9001 of QMS; ISO 14000 & 14001 of EMS and the Deming's PDCA cycle all points to how organisations can improve their business performance in ascertaining good customer satisfaction and sustaining the environment which forms part of the research objectives.

Moreover, this research recognises that having all the necessary tools and techniques for TQM implementation are not enough without the proper staff required to handle its actualisation. In respect to that, quality training and other programme like seminars, symposium, and lectures are being developed as part of the strategic process for quality implementation.

Finally, evidence gathered from the study has made it clear that implementation of TQM for SD enhances environmental sustainability. Above all, this research has established that TQM for SD is a collective responsibility for safeguarding the environment for sustainability.

RECOMMENDATION

Besides the analysis, discussion and solution, the researchers identified the following as suggestions or recommendations to FEPA:

- ❖ FEPA should re-evaluate and re-state its vision and mission statement and develop a new strategic plan for its operation.
- ❖ Establish a compulsory TQM training for her employees with the correct quality tools and techniques.
- ❖ Provide a measure to check organisational performance and monitor non-conformance.
- ❖ Advertise best organisational culture to change the image of the organisation.
- ❖ Build a policy that will incorporate both national and international bodies.

Hence, the researchers ended on this note to persuading FEPA's management to incorporate Deming's Plan-Do-Check-Acts to enhance performance.

REFERENCE:

Al-Dabal, J. K. (2001) *Is Total Quality Management Enough for Competitive Advantage?* Realities in Organisations Implementing Change Initiatives: with Examples from the United States and Developing World. USA: Dissertation.com [Online] available from <http://books.google.co.uk/books?id>> [22 November 2011]

Amsden, R. T.; Butler, H. E. and Amsden, D. M. (1998) *SPC Simplified: Practical Steps to Quality*. USA: Productivity, Inc

Amsler, S.S. (2009) "Embracing the politics of ambiguity: towards a normative theory of sustainability", *Capitalism, Nature and Socialism* 20 (2), 111-25

Atkinson, G. (1995) *Construction quality and quality standards: the European perspective*. London: Chapman & Hall

Anago I. (2002) *Environmental Impact Assessment as a Tool for Sustainable Development: The Nigeria Experience*. 'TS10.3 Sustainability FIG XXII International Congress'. held 19-26 April 2002, Washington, DC. USA. [online] available from http://www.fig.net/pub/fig_2002/Ts10-3/TS10_3_anago.pdf [06 July 2011]

Andrew, G. C. (2009) *Canadian Professional Engineering and Geoscience: Practice and Ethics*. 4th edn. Canada: Nelson Education Ltd

Andrle, J. (1994) 'Total Quality Management in Public Transportation', *Research Result Digest* 3, 1-33

Arvind, J. (2007) "Environmental protection and sustainable development exploring the dynamics of ethics and law", *Journal of Indian Law Institute* 49 (1), 30-59

Azhar Z., Naz A., Gul A., and Nawaz M., (2013) The role of TQM and BPR in executing Quality improvement: a comparative study. *European Journal of Business and Management* 5, (1) 2013, 1-9, ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online) www.iiste.org

Baird, R. C. (2009) "Coastal urbanization: the challenge of management lag" *Management of Environmental Quality: An International Journal* 20 (4), 371-382

Krasnick (1993) *Quality Practice management: How to Apply the Principles of Total Quality Management to a Medical Practice*. 2nd edn. Pennsylvania: The Thayer Group, Inc

Berman (2008) *Waste Reduction Volume 1: Report on Science and Technology Committee, 6th Report of Session 2007-08*. House of Lords Blandford, S (2000) *Managing professional development in schools*. London: Routledge

Boomie O. (2002) *Motherland Nigeria: Brief History*. [online] Available from <http://www.motherlandnigeria.com.html> [14 November 2011]

Charantimath, P. M. (2011) *Total Quality Management*. 2nd edn. India: Dorling Kindersley (India) Pvt. Ltd

Cheng, T. C. E; Podolsky, S. and Jarvis, P (1996) *Just-in-Time Manufacturing: An Introduction*. 2nd edn. London: Chapman & Hall

Connor, R. and Dovers, S. (2004) *Institutional change for sustainable development*. UK: Edward Elgar Publishing Limited

Dahlgaard, J. J.; Kristensen, K.; and Kanji, G. P. (2005) *Fundamentals of Total Quality Management: Process Analysis and Improvement*. London: Nelson Thornes

Dale, A. and Robinson, J. B. (1996) *Achieving sustainable development: A Project of the Sustainable Development Research Institute*. Canada: UBC Press

Dale, B. G., Cooper, C. L., and Wilkinson, A. (1997) *Managing Quality & Human Resources: A Guide to Continuous Improvement*. Oxford: Blackwell Publishers Ltd

Dale B. G., and Lascelles D. M., (1997) 'Total quality management adoption: revisiting the levels', *The TQM Magazine* 9 (6), 418 – 428

Elkins, P., Simon, S., Deutsch, L., Folke, C. and De Groot, R. (2003) "A framework for the practical application of concepts of critical natural capital and strong sustainability", *Ecological Economics* (44) 2/3, 165-85

Ewy, R. and Gmitro, H. A. (2010) *Process Management in Education: How to Design, Measure, Deploy, and Improve Educational Processes*. USA: Quality Press

- Fien, J.; Maclean, R. and Park, M. (2009) *Work, Learning and Sustainable Development: Opportunities and Challenges*. UNEVOC: Springer
- Garvin, D. A. (1987) "Competing on the eight dimensions of quality" *Harvard Business Review*. November-December 1987
- George, C, and Kirkpatrick, C. (2007) *Impact Assessment and Sustainable Development: European Practice and Experience*. Uk: Edward Elgar publishing Limited
- Goetsch, D.L. and Davis, S.B. (2006) *Quality Management: Introduction to Total Quality Management for Production, Processing, and Services*. 5th edn. USA: Pearson Education Limited
- Holzer, M and Lee, S (2005) *Public Productivity Handbook*. 2nd edn. USA: Routledge
- Ho, S.K. and Fung, C.K. (1994) "Developing a TQM excellence model", *The TQM Magazine* (6) 6, 24-30
- Hooper, A. (2005) *Culture and Sustainable Development in the Pacific*. Australia: Asia Pacific press
- Ishikawa, K (1989) *Introduction to quality control*. Tokyo: JUSE Press Ltd
- Juran, J. M., and Gryna, F. M., (1988), '*Juran's Quality Control Handbook*', McGraw-Hill Book Company New York, NY
- Juran, J.J. and Godfrey, A.B. (1999) *Juran's Quality Handbook*. 5th edn. USA: McGraw-Hill
- Jurow, S. and Barnard, S. B. (1993) *Integrating total quality management in a library setting*. USA: The Harworth Press, Inc.
- Jones, P.; Daphne, C. and Hillier, D (2011), "Sustainability in the global shop window" *International Journal of Retail & Distribution Management* 39 (4), 256-271
- Kanji, G. K. (1995) *Total Quality Management: Proceedings of the First World Congress*. London: Chapman & Hall
- Kelada, J. N. (1996) *Integrating reengineering with total quality*. USA: ASQC Quality Press
- Liotta, P. H.; Mouat, D. A.; Kepner, W. G. and Lancaster (2008) *Environmental Change and Human Security: Recognizing and Acting on Hazard Impacts*. Netherlands: Springer Publisher
- Lofgren, M.; Witell, L. and Gustafsson, A. (2011) "Theory of attractive quality and life cycles of quality attributes" *The TQM Journal* 23 (2), 235-246
- Luft, J.(2010) "Lifetime contribution to management accounting award" *Journal of Management Accounting Research* (19):169
- Mehta, P. V. (2004) *An Introduction to Quality Assurance for the Retailers*. USA: iUniverse, Inc
- Magutu O.P.; Mbeche M.I.; Nyamwange O.S.; Mwove M. and Ndubai E.R. (2010) "Management Through Effective Information Quality Management (IQM) in Banking Services", *AJBUMA* 1, 96-111
- Manjunath S.J. and Kumar G.A. (2013) Impact of Total Quality Management on Productivity and Quality: A Study at General Motors. *Asia Pacific Journal of Marketing & Management Review* (4) 2 1-12, ISSN 2319-2836, Online available at indianresearchjournals.com
- Morfaw, J. (2009) *Total Quality Management (TQM): a model for sustainability of projects and programs*. USA: University Press of America, Inc
- Morfaw, J. N. (2011) *Project Sustainability: Comprehensive Guide to Sustaining Projects, Systems and Organisations in a Competitive Marketplace*, USA: iUniverse
- Nejati, M. and Nejati, M. (2010) Global Business and Management Research: *An International Journal* 2 (1) [Online] available from <<http://books.google.co.uk>>[22 November 2011]
- Oakland, J. S. (2003) *Total Quality Management: The route to improving performance*. 2nd edn. Oxford: Butterworth-Heinemann Ltd
- Nwoko-Omere, W. C. (2012) Total Quality Management for Sustainable Development: A Case Study of Waste Management. An MSc Thesis, Department of Engineering Project Management, Coventry University, U.K.
- Omonfonwan, S. I. and Osa-Edoh, G. I. (2008) "The Challenges of Environmental Problems in Nigeria" *Journal of Human Ecology* 23 (1), 53-57

- Pfohl, H. C and Shen, X. (2008) *Apparel Supply Chain between Europe and China: A Guide to Apparel Sourcing and Distribution in China*. China: Technische Universitat Darmstadt
- Powell, T. C. (1995) "Total quality management as competitive advantage: a review and Empirical study" *Strategic Management Journal*, 16, 15-37
- Razzaque, J. (2002) "Human rights and the environment in South Asia", *Environmental Policy and Law* 32 (2), 99-111
- Rostron, J. and Jackson, R.P. (2001) *Environmental Law for the Built Environment*. Abingdon: Routledge
- Rogers, P. P.; Jalal, K. F. and Boyd, J. A. (2008), *An Introduction to Sustainable Development*. London: Earthscan
- Sheate, W. R (2010) *Tools, Techniques & Approaches for Sustainability: Collected Writings in Environmental Assessment Policy and Management*. Singapore: World Publishing Co. Plc. Ltd
- Sheldon, C. and Yoxon, M. (2006) *Environmental Management System: A Step-By-Step Guide to Implementation & Maintenance*. 3rd edn. UK: Earthscan
- Shepard, R. B. (2005) *Quantifying Environmental Impact Assessments Using Fuzzy Logic*. USA: Springer
- Smith, R. S, (1998) *Profit Centre in Industrial Ecology: The Business Executive's Approach to the Environment*. USA: An imprint of Greenwood Publishing Group, Inc
- Spitzer, M. A. (1999) *Towards a Sustainable America: Advancing Prosperity, Opportunity and a Health Environment for the 21st Century*. USA: The President's Council on Sustainable Development
- Stockmann, R. (2008) *Evaluating and Quality Development*. Germany: Peter Lang GmbH
- Suganthi, L. and Samuel, A. A. (2004) *Total Quality Management*. New Delhi: Prentice-Hall of India
- UNCED (1992) *Earth Summit '92*: Rio de Janeiro
- Verma, N. (1998) *Similarities, Connections, and Systems: The Search for a New Rationality for Planning and Management*. USA: Lexington Books
- Wallace, B. (2005) *Becoming Part of the Solution: The Engineer's Guide to Sustainable Development*. USA: ACEC
- Wang D. (1999) "Socioeconomic characteristics of rural urbanization in Southern Jiangsu, China" *International Journal of Social Economics* 26 (1/2/3), 290-297
- WCED (1987) *Our common future*: Brundtland Report
- Weijermars, R. (2011) *Building Corporate IQ - Moving the Energy Business from Smart to Genius: Executive Guide to Preventing Costly Crises*. London: Springer
- Williams, C. and Buswell, J. (2003) *Service Quality in Leisure and Tourism*. UK: CABI Publishing
- Williams, C.C. and Millington, A.C. (2004) "The Diverse and Contested Meanings of Sustainable Development", *The Geographical Journal* 170 (2), 99-104