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Analysis of the Impact of Quality Planning on Capital Budgeting using Juran Trilogy model in Public Sector Organizations in Ghana

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Abstract
The capital projects of the public sector organizations in Ghana (the sector), analyzed was with investment appraisal from the impact of quality planning. The theories raised are Pareto analysis, morality, ethics and the Gantt chart, for quality solutions as the quality improvement on wicked problems derived. The existence of risks and uncertainties was determined from the developed investment appraisal method, inputting the NPV and IRR. Quality assurance from capital projects decisions determined was with statistical inferences. The test statistics from chi-square failed to reject the hypothesis, of not significant, as the p-value was greater than alpha ($p>\alpha$). The recommendations among others, the Juran Trilogy model of quality- planning, control, and improvement factored must be into all capital decisions. Also, in conclusion among others, quality assurance on manpower training, and the Emerging concept, as standard investment appraisal tool recommended.

Keywords: *Quality Planning, Capital Budgeting, Juran Trilogy model, Public Sector Financing*

1.0 INTRODUCTION

The study undertaken is on, analyzing 'the impact of quality planning on capital budgeting'. Therefore, for an in-depth concept determination, 'Juran's Trilogy model' on quality planning is used for the analysis in public sector organizations in Ghana[1]. The concept of capital budgeting can be described as a process that, 'involves measuring the incremental cash flows associated with investment proposals, and evaluating the attractiveness of these cash flows relative to the project's cost', Petty et al. (2006, p.301). In developing the theory, the 'investment proposals involve rather large cash outlays at the outset, and commit the firm to a particular course of action over a relatively long period', Petty et al. (2006, p.301). In line with these concepts that, 'Juran's Trilogy model' for quality management, is used to analyze the impact on capital budgeting in the sector. The sector ascertained as the investor has major capital injection decisions. Therefore, these major decisions, managed should have quality assurance as retrieved from the 'Juran's Trilogy model' of; Quality planning, Quality control, and Quality improvement. The major decisions are realized from road networks, building constructions of schools and hospitals, utility and other infrastructures, assessed with the 'three (3) E's' of 'efficiency, effectiveness and economical.' Therefore, marching from these discussions that, research questions have ensued for answering. From these research questions, the hypothesis has been developed in determining as follows;

- N_0 - 'projects' in the sector does not determine quality assurance'.
- N_1 - 'projects' in the sector does determine quality assurance'.

From the research questions and the hypothesis developed, requisite survey questionnaires and interview questions are formed to derive the statistical results for interpreting the study. Also, the research methods and methodology used is quantitatively derived forming from the sample population of the sector further classified into the sample size. The confidence level of the study determined was with the 95% confidence. In furtherance, the outcome from the mathematical computations, as indicated serves the recommendations and the conclusions for academia, analyzing from the sector.

1.1 BACKGROUND OF STUDY

The underlying concept, drawing from capital budgeting is to create value or net worth for the investor, whose 'large cash outlays', Petty et al. (2006, p.301), invested. Therefore, it beholds that, 'corporations exist to create wealth for shareholders, and this achieved can be by making profitable investments', Petty et al. (2006, p.300). From this understanding, Managers are employed to manage these investment processes, and achieve the objective of the investor or shareholder, of 'making profitable investments', Petty et al. (2006, p.300). For the achievement of the 'profitable investments' aim, there are investment appraisal models for evaluating the net worth of these long-term

[1] Keywords and Abbreviations: public sector organizations in Ghana – 'the sector.'

investment projects, amidst calculated risks and uncertainties realized. However, in identifying 'profitable investments' as indicated by Petty et al. (2006, p.300), the uncertainties could be measured as attached problems. These problems in solving them could cause the whole process of investment with positive returns on the capital invested in a negative outcome.

Therefore, the major decision-making of entering into the investment venture or the emergence entangles the Managers, hired for an assigned performance. The study established that the Managers are employed for results oriented motives. Therefore, their deliverables are measured by their achieved results. However, Managers also have their personal aims, determined from the theory of 'Agency Costs,' of which glues them to 'strategic military heightened battle-field decisions[2]' to achieve their targeted outputs. Therefore, the outcome brings into appreciating the concept of Pareto 80/20 rule. The rule analysis that, an input of 20% commitment solution brings out the output of 80% results for the problem, all things being equal, 'a garbage in, commensurate a garbage out'. The agency costs theory, to an extent could be ascertained as the driving-force that determines the decisions that Managers take at certain points in time, aligned to Pareto's 80/20 rule, all things being equal. These forces determined, could be costs to investment decisions, crafted from certain investment appraisal techniques like the Discounted Cash Flows (DCF) of the Net Present Value (NPV), for determining an accepted outcome of '+1' decision.

Furthermore, the 'cost-benefit analysis' for investment outlays for profitable decisions is also a tool for valuable decisions outcome. More so, where difficulties exist, the advanced techniques facilitating risks of the Sensitivity and Simulation analyses can be determined. In concluding to the outcome, the question mostly raised is on the morality of the 'profitable investments' of Petty et al. (2006, p.300). It indicates that, Does the Manager become, 'moral, amoral or immoral', as determined in the psychological and socio-religious parlance, to achieve investment results? The instance from this indication aligned, is from the 'Ford Pinto' saga of coming-out with a strategic decision for the valuable outcome of the business. They had lost lives of users of their product, against the settlement of court payments for law-suits, to accepting the value oriented decision of substantial costs of correcting their auto-defects, before introducing them to the market. From the underlying appreciations, that quality according to Juran and Godfrey (1999, p.2.2) described is the 'freedom from deficiencies- freedom from errors that require doing work over again (re-work) or that results in field failures, customer dissatisfaction, customer claims, and so on'.

Therefore, capital budgeting decisions matching to profitable investment decisions, when quality factored is into the appraisal models that could drive from Juran's Trilogy model identified as, the 'sequences of activities that produce the intended results,' Juran and Godfrey (1999, p.2.5). In building the 'intended results', Pyzdek and Keller (2013, chpt.2, online), develops from Juran and Gryna (1988), grouping the quality activities into the referred 'Juran trilogy of, quality planning, quality control, and quality improvement.' The Juran trilogy, from Pyzdek and Keller (2013, chpt.2, online), determined by Juran and Gryna (1988) are;

- 'Quality planning is the activity of developing the products and processes required to meet customers' needs.
- Quality control is the process used by operational personnel to ensure that their processes meet the product and service requirements (defined during the planning stage), and
- Quality improvement aims to attain levels of performance that are unprecedented—levels that are significantly better than any past level.'

Therefore, these factors could be developed as the measuring rod for quality management impacting on capital budgeting in the sector.

The sector noted with various tendencies of political interplay into decisions ensuing from their outfits, make planning and control purposes mostly unreliable. These causes' targets set to be mostly unachievable. There are always busy activities in the sector, for instance, engineers identified busily working on identified projects, but at the end of the day, results could be ascertained with apologies and excuses, determined as unachieved. Also, various journals and literature reviewed had quality management theories from the Japanese concepts through to the American systems, and others in the sector were reviewing effectiveness, efficiency and economic as measures on government spending. The study of Hookana (2011), on 'Measurement of Effectiveness, Efficiency, and Quality in Public Sector Services - Interventionist Empirical Investigations' is ascertained. The paper presented was in the Proceedings of the 12th Management International Conference at Portorož, Slovenia, from the 23rd to 26th of November 2011. It aims at the discussion on effectiveness, efficiency, and quality. The discussion furthers on services delivered by the public services. That is, where 'the wider context of prevailing ideas about the role of government in the promotion of welfare services' and, their bases to effectiveness and efficiency achievements on the deliverables. There were three offered

[2] At the odd circumstance, a decision to pave the way for the troops to move on smoothly, without any delay to be traced by enemies.

'descriptions of efforts for developing the measurement systems in the public sector organizations' Hookana (2011, p.491), being. The mutual commitment, suitability of the measurement system and goals of the organization, professed to be the main basis for success.

Also, relations to cost-efficiency, as resulting to the provisions from the public measuring to the private, shows that effectiveness is a problem with the public. Again, Zubair's (2013) study, made an effort to compute the degree of the implementation of Total Quality Management (TQM) in Public Sector Higher Education Institutions of Pakistan. The study uses a quantitative approach to ascertaining an above 0.80 value of Cronbach's Alpha of the considered TQM derived for the study. The study derives that, 'TQM adopted is in higher educational institutions but at a slower pace', Zubair's (2013, p.24). Other areas of notable reporting discussed are also on 'areas of improvement including, Leadership, Vision Ownership, Evaluation Standardization, Process and Continuous Improvement, Employee Training and Student Focus' Zubair's (2013, p.24).

Furthermore, an article by Stringham (2004, p.24) on, 'Does Quality Management Work in the Public Sector?', 'examines the quality movement in the United States during the past two decades in the context of public management.' The focus is on the efficacy of quality management approaches in present times, as pertaining to the speedily changing public organizational setting. The theories and other journals discussed, show that the study has a unique standing and that it has not been re-produce by any other person. Therefore, for an academic know-how achievement from the theories discussed, and to be done, it is hopeful that, the background of the study determines quality assurance in the sector, from the capital budgeting concepts' impact.

2.0 LITERATURE REVIEW

In reviewing the literature on quality management, purposefully on capital budgeting, thrives on tactical decision making. There are lots of theories and concepts from various disciplines, from science, philosophy, psychology and management among others. It is from the theories and concepts from the disciplines, which the study ensues.

2.1 Foundations Of The Study

The foundations of the study ensue from, the definitions and theoretical thinking of quality management theories, and financial management for the capital budgeting concept. The foundation concludes on the sector. From the underlying theory on financial management, capital budgeting according to Peterson and Fabozzi (2002, p.5), is defined as, 'the process of identifying and selecting investments in long-lived assets, or assets expected to produce benefits over more than one year.' From decisions on 'the process', the foundation also builds from risks on cash flow. The risks according to Peterson and Fabozzi (2002, p.5) are, the sales risk, which 'relates to the economy and the market in which are the sold firm's goods and services.' Also, the operating risk, 'is determined by the product or service that the firm provides and is related to the sensitivity of operating cash flows to changes in sales.' According to Peterson and Fabozzi (2002, p.5), the terms are therefore described as 'business risk'. The business risk reflects the discount rate that determines the cash flows, for the posture of the business worth. The expected outcome of the business worth ensues that, where; 'positive, the project returns more than the cost of capital; negative, the project returns less than the cost of capital; and zero, the project, therefore, returns the cost of capital.', Peterson and Fabozzi (2002, p.5).

The basis of this theory should have to align with the corporate strategy and objective of the business, being the sector. The corporate strategy and objective of the sector identified could be the provision of political, economic, social, technological, legal and environmental amenities and infrastructure. These provisions identified can be for the growth and development of the general public. The general public identified is the customer, with a requirement. Therefore, 'assets expected to produce benefits over more than one year', Peterson and Fabozzi (2002, p.5), should have the impact of the quality requirement for the customer. The foundation of the study is to a larger extent, determined by this outcome. It, therefore, indicates that the meaning of quality should also be derived inline to the outcome, for the study. In deriving the meaning of quality, Juran and Godfrey (1999, pp.2.1-2.2), determine the managing of quality from two important understandings as; 'those features of products which meet customer needs and thereby provide customer satisfaction', with the hope of increase in income, and which "costs more."' Also, 'freedom from deficiencies — freedom from errors that require doing work over again (rework) or that result in field failures, customer dissatisfaction, and customer claims, and so on.' However, cost is the determinant, noted that 'higher quality usually "costs less."' The ascertained quality theories with their features are the bedrock factors for the study.

2.2 Development of the Study

The phases of the study ascertained is from the basic definitions of quality management and capital budgeting. The theory focuses on the activities of the sector. In acknowledging the activities of the sector, the substantial cash injection decisions, were determined by quality. Therefore, the study drew that, Juran's Trilogy model of quality- planning, control and improvement, was used. In the usage of this model of quality, on capital budgeting, it was prudent to derive theories on morality from- moral, amoral and immoral. The reason is that Managers are contracted to perform tasks for most services. Their performances measured are with performance measurement indicators and paid as reaching performance. However, jobs done outcome from the perspective of the final consumers do not merit a good performance. Therefore, quality meaning to an extent suffers an achieved outcome for the sector. The issue, therefore, comes forth that, the duties of Managers in authority, aligning to morality have an informed role. From the morality tendency that the agency cost theory also encapsulates. Agency cost determined could be as the undercover of ethical behaviours. The outcome is that Managers prefer to pay themselves well, and derive military-tactics strategies to serve the consumers with products or services with known defects. These defects when finally become a death trap for the consumers will be defended to the core, and strategically some few innocent-ones suffer the blame game.

Also, the 'cultural dimension' theory of Hofstede (2011), analyzed to the quality model for the sector is prime. The culture of the theory of quality for the study, Juran coming from Japan measuring this concept to the sector in Ghana is important. It is important for Pareto 80/20 rule that, when an input done of quality planning is with the required quality control measured given. The output of 80% measures the quality improvement for the consumer. However, the opposite could cause a problem, further derived as a wicked problem, according to Conklin (2001-2010, pp.7-12). The evolution emerges from these theories as the underlining concept for the sector. The recommendation and conclusion, from formulas, theoretically given and when conceptually analyzed to the study does not fit, from the following outcomes. These results ensue from the culture setting, economic weather- the fiscal policies interplaying as assumptions from risks and uncertainties. In a nutshell, the Juran Trilogy model given tends to analyze the performance of the sector, amidst the political terrain, all things being equal.

2.3 Different Theories

Juran's 1954 lecture for Executive Managers on quality aligns to morality, and the outcome had a passion from the tone of the lecture. Therefore, quality planning and management from the study to a larger extent discusses moral attitudes and behaviours for those in authority for capital intensive decision making.

2.3.1 The Concept from Juran Trilogy

The model, Juran Trilogy is developed by Juran and Godfrey (1999) as devised in Appendix 5, Table 2 as; Quality planning 'is a structured process for developing products (both goods and services) that ensure that the final result meets the customers' needs.' Juran and Godfrey (1999, p.3.2), Quality control 'is a universal managerial process for conducting operations so as to provide stability—to prevent adverse change and to "maintain the status quo." There, to maintain stability, the quality control process evaluates actual performance, compares actual performance to goals, and takes action on the difference.' Juran and Godfrey (1999, p.4.2), and Quality improvement is "the organized creation of beneficial change; the attainment of unprecedented levels of performance." It further draws that, 'quality improvement is to increase income and to reduce deficiencies that create chronic waste', Juran and Godfrey (1999, p.5.3). From the concept, Top Management should get involved in the activities of the business. The theory invoked is Pareto rule, training for employees in quality and the definition given in quality deficiency and product conformance as the 'fitness for use', Juran and Godfrey (1999, p.4.20).

Therefore, capital budgeting determined as taking capital intensive decisions on long-lived assets, with the result of a future commensuration outcome of profitable gains. The sectors' activities assessed with the 3Es of Economic, Efficiency and Effectiveness, of intensive capital injections have varied research questions on the possibility of Juran trilogy as a model to impact the capital budgeting decisions. The result of the decisions reflects on the public as a socio-economic development on their way of living. However, wicked problems ensue to the extent that, standards set to adopt quality are flawed. These outcomes identified are from the model that customers' enhancement is the key. Therefore, the Top should put in the necessary tools to achieve success. The 'way of life' of indigenous people factored is not in the Juran's trilogy model. The culture of the people is the key factor when quality determined is from the stakeholders' perspective. Inference taken is when a funeral for an employee occurs, the other employees to complete the quality assurance cycle outcome towards capital projects, becomes an issue. The Gantt chart with timelines will suffer the constraint elements of cost, time and quality from the identified issue. More so, behavioural tendencies also factored in quality assurance are not identified in Juran's trilogy model. Therefore, the general concept easily affects quality from most spheres in the sector stratified.

2.3.2 The Quality Thinking and Concepts

The different theories relating to quality measured are that, purposefully, cash injection put into projects must satisfy its purpose, for the customer and business owner. Therefore, the aligning thinking and concepts from the studies of Juran, Deming and Crosby are; Customer focused, Commitment and Leadership from Top Management, Continuous Improvement Based on Facts, and Team-Based, (online, p.5). In deducing the different theories to quality – planning, control and improvement, the comparison of the quality philosophies of these quality gurus, Juran, Deming, Crosby and the Japanese TQM, as derived by Froehlich and Kent (1995, p.153) is developed in Appendix 5 (Table 1) for analysis. The theories from Deming on the basic elements of Table 1, measuring from the Statistical Quality Control (SQC), and Juran's trilogy are derived from the improvement of the process ideas as captured by Crosby. These theories skew to a point for improving the output requirement of an organization. The relationship between processes is positively affected by which consideration derived is to projects done for the socio-economic development of the customer.

Therefore, Pareto 80/20 rule, of 80 percent efficiency results from the effective considerations done, as the Juran trilogy- quality planning and control, effectively considers that maximum input as the customers desired requirement. These ascertained are from the established goals determined by the quality for the general public consumption, with quality control inputs of evaluation on the actual performance, to the needed established infrastructure, where the projects' provided are with requisite motivations and the needed resources to establish system controls for the profitable gains. Also, training requirements are essential for quality costs improvements. There are also other models determined from statistical tools where Shewhart appraised is with his student Deming. From this point, the seven basic graphical tools or diagnostic charts derived are the; Cause-and-effect or the fishbone diagram. The use of this chart is basically to consider the 'four problem areas, namely, methods, materials, equipment, and personnel, Froehlich and Kent (1995, p.8), for 'open brainstorming'. Pareto chart. The concept of efficiency prevails and that the underlying factor from the 80/20 rule supports to this effect. Therefore, where there are ensuing problems for the corrective measure, the chart is drawn from computed frequency values, from which the highest occurrences are the targeted problem zones for corrections, and it follows as such. Therefore, the Pareto chart is a useful tool for identifying problems for solution, and not an instrument in solving as such. The rest of the tools are the; Flow charts, Histograms, Control charts, Scatter plots, and Check sheets, derived by Froehlich and Kent (1995, p.159). The statistical tool used is for 'the estimation of the true values of a product's characteristics', Froehlich and Kent (1995, p.136).

However, the outcome of all these different quality theories indicates that the second definition of quality not adhered to is Juran's. Therefore, there is the need to compute issues like constant-failure rate, all things being equal. The gained presumption is that Conklin's' tamed problems theory rules, and if not well addressed could result in a wicked problem. The outcome shows how even concepts like the Cost/Benefit analysis of some substantial cash injections, should be used to affect negatively quality as an output affecting 'human-lives' or, enter-into immoral values to affect a positive reward for the organizations' resultant value for the investors' worth yield. The theory of Pareto analysis in determining problems for solution identified is from the discussion. The table 2 of appendix 5 shows stratified sampling cases for the sector, with the Pareto analysis, and the chart reviewing quality improvement. Also, the axiom, 'higher risks goes with higher returns', is much of concern in capital budgeting. The reason is that risks associated with uncertainties could prevail when capital intensive projects are carried out. Therefore, in computing for the accept/reject of the intended project, using an appropriate investment appraisal tool, risks should have to be adequately measured to forestall unforeseen contingencies, which unrealizable crystallizes. Quality planning from Juran's trilogy basically could be taken as the initial plans for a project, visualizing the customer's enhancement for the outcome. The results of value are for the investor, from the achieved customers' enhancement. However, from the Delaware's court position of Widen (2008, pp.579-604), an investment appraisal technique approved by the land's laws, factors risks and uncertainties as acknowledged indicating an input of quality. It will further, as a margin, will not auger well for the quality planning as a concept through to its control. Also, from statistical quality control, Pareto chart and the fishbone chart appreciation, it develops on an already done project, being monitored for corrective improvement. Thereby, costs have already been incurred, and where problems ensue corrective measures put in place are for quality performances, which also is another cost element. Therefore, quality planning and control have to be done right from the inception of projects.

2.3.3 The Concept of Capital Budgeting Tools

In deriving the impact of quality planning from Juran's Trilogy model, capital budgeting or investment appraisal tools of discounted cash flows (DCF) models are factored from the Net Present Value (NPV), and Internal Rate of Return (IRR). Furthermore, the advanced models taking risks from the perspective of the Sensitivity and

Simulation analyses are the models, where the failure of the other tools occurs. Also, when risks and uncertainties factored are into the NPV and IRR models, the Emerging concept develops as with the mark-up on the functional formula for vital decisions on cash flow. Therefore, in deriving quality outcome for capital intensive decisions, the Emerging concept is determined to have the basis computation from NPV and IRR with Microsoft Excel as;

Table 2-2.3.3 Determining Quality with the Emerging concept

	Using Excel functions
cash inflow (initial inflow) [CF]	
discounting valuation – [dv]	=NPV(r, CF)^ n=1year period for whole sum values.
add: cash outflow (initial investment) – [IO]	=IO - ((1+r) ^n)
NPV	=dv + IO
IRR	=IRR(dv : IO [range],r)
interest rate [r] / number of period [n]	

The theory underlying the table, is derived from the functional formula determined as,
$c = ((1 + r)^{\wedge}n_1 - \mathrm{IO}((1 + \mathrm{r})^{\wedge}n)$ where, IO = initial investment,
r = interest rate (cost of capital)
n = number of period
CF = cash flow

The determining theory taken is from the cultural dimension of Hofstede (2011) on individualism, power distance, uncertainty avoidance, and masculinity. These factors determined are from behavioural tendencies and other forces from the acronym of 'PESTLE' (Political, Economic, Socio-Religious-Cultural, Technical/Technological, Legal, and Environmental) in ascertaining risks, uncertainty, and certainty, in quality planning and control. Therefore, the NPV and IRR results determine the sectors' output, when all the systems are working through with no defect, all things being equal, for quality planning. In furtherance, the envisaged advantages are;

i. It considers the time value of money,
ii. It considers the mark-up for uncertainties determinants for the expected future cash flow,
iii. It considers the acronym determinant of values from risk and uncertainty, 'PESTLE',
iv. It considers the maximization of owners' wealth, derived as business-mindedness.

Also, there is the disadvantage that;

i. It determines an insignificant uncertainty, of which at the long-run is determined significant.

2.3.4 Capital Budgeting Project Model – Gantt chart

In developing theories on quality planning for projects, the interplay of project constraints emanating from time, cost, and quality is considered of great importance. The study ascertained that, for a valuable result to evolve, risk and uncertainty environments working against the sectors' projects stratified has to be with due diligence addressed. From the identified underlying concepts, the models of the network analysis for projects comprising of the Critical Path Method (CPM), Breakeven Analysis, and Gantt chart developed are for quality planning. The Gantt chart is a planning and control concept that considers the constraint elements of time, cost, and quality from the start to the end of projects. It is a horizontal bar length chart of planned and actual project of activities with duration, from the start of one activity to the end, and follows sequentially. It indicates that projects are developed to have a definite start time through to an end time, and follows to the next target activity, all things being equal. The limiting factor of the theory is that;

- Cost elements factored are not into the activity-duration, however, a developed activity will have a cost implication. The cost consideration determined by the capital budgeting tool can be by the Emerging concept in accepting/rejecting projects on value outcome.
- Also, the activities do not indicate the start to the end, rather only to show the duration.

The advantages of the theory being that,

- It presents a visual pictorial representation of projects, and
- The vital activities pictorially recognized.

Therefore, from the constraint elements of time, cost, and quality, from the Gantt chart point of view, Juran's trilogy of quality- planning, control, and improvement determines the satisfaction for the final consumer of the product or service. Juran's trilogy technically determines these constraint elements along the Gantt chart's activity-duration, from a determined case study of the sector, stratified. The Gantt chart is therefore developed as follows from the derived Microsoft Excel tables and into the chart as;

Table 3-2.3.4 Derived Project Example of Gantt analysis table

Activity	Activity Description	Duration (days)
A	Planting of LV/HT Poles (scope- 5-10days)	8
B	Stringing of conductors (scope- 5-10days)	10
C	Mounting of Transformer (Equipment)	5
D	Inspection, Testing, and Commissioning	5
	total	**28 days**

The Gantt chart developed will be from the table above in a similar stead for the study's case data stratified for the sector. In a nutshell, the different theories of quality and quality planning draw the initial plan for the capital intensive project without costs elements. Therefore, where constraint elements on quality control and improvement ensue, to a larger extent, have to be re-worked at the time, cost and quality elements, all things being equal.

2.4 Historical Thinking

The theory of capital injection into projects sides with the theory of quality, as outcomes, gives the assurance. Therefore, the theory of quality from historical thinking developed through the middle ages or medieval period of the 5th to the 15th century is derived. The era of about 1,000 years before this period had activities noted to be also of quality, but theories are not to this era ascertained much. However, history of the architectural displays, weaponry, clothing and costume are the outcome identified. There are massive civilization quality projects recorded like the Hanging Garden of Babylon, the Ziggurats at ancient Mesopotamia in Ur of 2100 B. C., the Great Giza Pyramid and Roman Coliseums to mention but a few. The planners and controllers of these capital intensive projects had timelines to complete these projects with quality assurance outputs. The study ascertained that projects had craftsmen whom further developed into guilds and had stringent supervision. Later on, the guild system turned out to be inspectors, as 'good quality practices' Froehlich and Kent (1995, p.125, online). The Kings and Rulers of the era would not allow any shoddy outputs, and had over-lords (inspectors) over projects steering the affairs of such. Those in artefacts, weaponry, clothing and costumes, science and medicine had over-lords same, and keen supervision to deliver quality outputs, or 'their execution calls' for non-performance, therefore, derived control systems. Hammurabi, the king of Babylonia's Code of the 18th century B.C., is identified by Kaganov, 2009 (p.10), with edicts as; Article 229. "If a builder builds a house for someone, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death." From the ensuing, the theory of quality could be attested to the outcome of projects of the era.

Most often, Kings want fame during their reign, and that projects should be well completed within specified architectural design and time frame for their achieved purposes derived. The Ziggurats, Great Giza Pyramid and Coliseums in Rome for socio-economic ventures were completed with the requisite quality to serve their purposes. The study developed that, around 2200 B. C., the Ziggurats were manned by priests for serving the populace. The Kings and the general public achieved the required outcome of these projects, with the embedded quality systems, as the derived customer enhancement and needs. In deriving the thinking of quality, as 'those features of products which meet customer needs and thereby provide customer satisfaction', Juran and Godfrey (1999, pp.2.1), projects during that era, and about 1,000 years before had traces to this concept. Also, the famous Royal Mail Ship (RMS) Titanic (1912), was established to have passed the quality test, and the second of three known 'Olympic-class ocean linear sister ships.' It was the largest ever in the world with the best of resources of all kinds, of which had a voyage resulting in a mess from the 14th April to the 15th April 1912 from the identified, lack of quality evaluation management systems. The quality planning and control from this project derived could be from the second quality meaning of Juran and Godfrey (1999, pp.2.2). The theory states, 'freedom from deficiencies — freedom from errors that require doing work over again (rework) or that result in field failures, customer dissatisfaction, customer claims, and so on.' It acknowledged further that capital intensive projects have ensued during this era, and beyond from the World War II and I era. It ascertained, therefore, from the public sectors' focus that, regulations are made for products and services through the times to the present era, pressing on quality for the output with an enforced authority, the quality control as a system.

Some of the quality theories developed over the periods to date are;

i. Total Quality Management (TQM) of the 1990s.
ii. Lean and Six Sigma a method of the Motorola for the Baldrige Award of 1988.
iii. The (International Organization for Standardization) ISO 9000 in 2000, with series of quality management standards developed of which some are;
    a. The automotive of (QS-9000),
    b. The aerospace of (AS-9000),
    c. The telecommunication with (TL-9000 and ISO/TS 16949),
    d. The environmental management (ISO-14000).
iv. Also, the Continuous Improvement, from the plan-do-check-act (PDCA) cycle, also known as the Deming or Shewhart cycle. It had TQM, Lean, and Six Sigma as further emerging theories.

The outcomes from theories emerging from these historical thinking developed have been into regulations and laws for regulating the public's consumption on quality. It is in-line with these results that, Juran, Deming, and Crosby had their quality thinking models developed. These results had a significant change in the business output, for the Japanese market. The American market in the 1950s had issues with the quality thinking and entered into product/service competition with the Japanese of which they flopped. They later-on embraced most of the concepts. In a nutshell, the historical thinking shows that quality planning and control gives the required offer for value.

3.0 Research Methodology

Research methodology compacts as the requisite tools in determining the outcome of the study. According to Rajasekar et al. (2013, p.2), research 'is an investigation of finding solutions to scientific and social problems through objective and systematic analysis.' It is about the wonder adverb, 'how'. Rajasekar et al. (2013, p.5), further indicate that 'research methodology is a systematic way to solve a problem.' Therefore, the work plan that applies to achieving the importance of the research work according to Rajasekar et al. (2013, p.5) is;

i) 'which is a suitable method for the chosen problem?
ii) what is the order of accuracy of the result of a method?
iii) what is the efficiency of the method?'

In furtherance, Rajasekar et al. (2013, p.5) develops that, research methodology is the tool explaining,

1) 'Why is a particular research study undertaken?
2) How did one formulate a research problem?
3) What were some types of data collected?
4) What particular kind of method used?
5) Why is it that, a particular technique of analysis of data used?'

Therefore, the study posits from achieving the objective of the study from the underlying theory, and its use in the study of capital budgeting and quality planning through the,

- Aims,
- Research design,
- Ethical consideration, and
- Research methods – samples, results, questionnaires, and interviews.

3.1 Aims

The aims of the study on the impact of quality planning on capital budgeting, using Juran's trilogy model in the sector, considers from;

- Statistically, adopting the quantitative and qualitative sampling methods, and the mixed of these research sample methods,
- Achieving an appropriate result from the developed hypothesis, through the requisite statistical methods,
- Using Juran's trilogy model of quality as the impact on capital budgeting in the sector, for answering the problem questions of the study.

The outcome was that the identified aims were the vital tools that appropriate research methods consider for the study.

3.2 Research Design

Research design crafted can be as the directional plan for the study. The plan identified from Blaxter et al. (2006, p.63, Box 3.3) develops, is identified for the study from the,

- Research families: data collection and processing techniques,
  - Quantitative or Qualitative,
  - Deskwork or Fieldwork.
- Research approaches: research design techniques,
  - Action Research, and
  - Surveys.
- Research techniques: data collection techniques,
  - Documents,
  - Interviews,
  - Observations,
  - Questionnaire.

Research design according to Malhotra and Birks (2000, p.75), are the 'exploratory research and conclusive research'. The study adopts the conclusive research, categorize into two areas according to Malhotra and Birks (2000, p.76). They are the descriptive research, 'used to describe some function or characteristics', and causal research, 'used to research cause and effect relationships'. Therefore, the descriptive research which explains the directional tools for researchers to adopt in assessing requisite tools in crafting data for valuable results is the defined method for the study. From the study, the conclusive research is developed as;

Table 5.3.2 Conclusive Research Design

Research project components	**Descriptors**
Research purpose	Specific – to verify insights and aid in selecting a course of action.
Data needs	Clear
Data sources	Well defined
Data collection form	Usually structured
Sample	Relatively large; objectively selected to permit generalization of findings
Data collection	Rigid; well-laid-out procedure
Data analysis	Formed; typically quantitative
Inferences/Recommendations	More final than tentative

As adapted, from the summary of Pride and Ferrell (2014, p.146), of A. Parasuraman (2007), Marketing Research, Second Edition 2007, Cengage Learning Inc.

3.3 Ethical Considerations

In gaining the required authority for using confidential data in pursuing the study, attaining ethical approval from all spheres of the sector is a recommendation. Therefore, attaining data for the study's case stratified for the sector, the appropriate steps in gaining the data is ethically viable. More so, interviews and survey questionnaires instituted follows the ethical procedure for tapping into the sectors', 'way of life' on quality planning for considerations. Therefore, from these underlying activities that Smith's (2003, pp.56-62) five (5) principles of research ethics considered was for the study as tabled;

Table 6-3.3 Smith's (2003) Five (5) Principles of Ethical Consideration of APA[3]

Principles	**Descriptors**
1- Discuss the intellectual property frankly	Financial reports taken are with no prejudice used for the secondary data collected.
2- Be conscious of multiple roles	Data taken is purposely for the academic exercise, and not for any other purpose.
3- Follow informed-consent rules	The study is supported by the University's authority in a letter to the sector, acknowledging the purpose of

[3] 'American Psychological Association's (APA) Ethical Principles of Psychologists and Code of Conduct' authored, are by Deborah Smith, a Monitor Staff. 'APA's Science Directorate Ethics Code offers general, specific guidance for research activities.'

	sourcing data, for the study. Also, that participatory is not mandatory.
4- Respect confidentiality and privacy	Survey questionnaires and interview questions do not encourage the taking of personal or private data for the study. Also, answers provided do not represent a person in nature.
5- Tap into ethics resources	The consent of respondents is prime for interviews, done. Also, various scheduled and approved meetings carried out have consented, before an interview system is done.

Therefore, concluding from the table designed from Smith's (2003) ethical principles, the study has the required ethical foundation for the sector stratified.

3.4 Research Methods

Research methods according to Rajasekar et al. (2013, p.5) 'are the various procedures, schemes, and algorithms used in research. These methods classified can be as the statistical elements for defining the study's hypothesis from techniques used for arriving at quantitative and qualitative data, further processed. They are, therefore, from the samples, results, questionnaires and interviews established.

3.4.1 Samples

The samples calculated were from the defined population size for the study. According to Dawson (2002, p.47), where the 'sample is chosen carefully using the correct procedure, it is then possible to generalize the results to the whole of the research population'. Therefore, the probability sample method of stratified sampling as ascertained in the table is adopted for the study. The outcome gives the chance of equal selection of a stratum for the study. Also, the adopting of the stratified method, to a larger extent sets precision high and minimizes error factoring. The study processes with Hair et al. (2007, p.171) table format determined as the 'sampling concept for population outcome' developed as;

Table 7-3.4.1 Sampling Concept for Population Outcome

Concepts	**Concepts Outcome**
Defining the target population	Targeted Population Size of 300
Choosing the sampling frame	Managers, Supervisors, Direct Reports
Determining the sampling size	Determining the sampling fraction of (½) for the sampling size of 150
Selecting the sampling method	The probability sample method of stratified sampling was selected. Qualitative and Quantitative analyses from survey questionnaires and interviews instituted with the method.

From the defined concept, accurate data for the sector is presumed to be attained to achieve the study's objective and answer the hypothesis.

3.4.2 Results

The study on quality planning with Juran's trilogy impacting on capital budgeting determined was as following;

i) Usage of Gantt chart in determining quality of the constraint element of time, aligning to cost and finally quality as an output,
ii) Usage of Pareto analysis and chart in determining the study's case data stratified for the sector, problems ensuing as a constraint on quality, and solutions enhancing the new Pareto chart developed,
iii) Computing the NPV and IRR models, and introducing the risk element of quality planning from the Emerging concept computation developed. The results are for capital budgeting decisions.

iv) Usage of the chi-square statistics at 95% confidence level precision, in calculating for the test statistics and hypothesis.
v) Finally, usage from the statistical computation in analyzing data ascertained from survey questionnaires and interviews done.

The quantitative and qualitative data processed are the results statistically analyzed. In a nutshell, the recommendations are the results of the fieldwork done.

3.4.3 Questionnaires

The survey questionnaires are the tools for unlocking solutions for the research problems. Therefore, in ascertaining these tools, that 'grouping questions that are similar will make the questionnaire easier to complete, and the respondent will feel more comfortable…the order of the questions can affect the way people respond', Walonick (2010, p.245). The underlying concept forms the basis for achieving the survey questionnaires. Therefore, the total number of nine (9) questions was used for determining the outcome of the study, the impact on quality planning using Juran's trilogy model for capital budgeting in the sector. The survey questionnaires defined were into,

- Section A comprised of two (2) questions on 'Demographic Data of Respondent',
- Section B of three (3) questionnaires examining the 'Existence and Importance of Quality Planning Systems for Capital Projects', and
- Section C of four (4) questions on the 'Existence and Relevance of Capital Investment Appraisal Systems for Quality Assurance Capital Projects', for investment appraisal analysis.

The considered survey questionnaires are provided as Appendix I.

3.4.4 Interviews

In attending to questions that the study is determining with for the results, it is known that there are three types of interview formats of structured interviews, Un-structured interviews, and Semi-structured interviews. The study approves of the semi-structured interview format, comprising of the combination of the two formats of the structured and un-structured interview. Walonick (2010, p.245) indicates that 'the order of the questions can affect the way people respond', in developing the structured interview format. Also, from the unstructured interview format, Blaxter et al. (2006, pp.80-87)[4] gives the study's guide of the eight consideration, with the prime on the first point of, What do you need or want to find out? The structured format developed was from the survey questionnaires and the interview questions. Also, there was the un-structured format ensuing from the fieldwork that quickly comes forth during the session, and these mostly facilitate in forming as recommendations and areas for future study. In furtherance of the underlying concept, the face-to-face interview was the adopted system. The choice of location for the interview was the choice of respondents for valued interaction was an accepted practice for the study.

4.0 DATA ANALYSIS

The data from survey questionnaires and interview questions from the semi-structured interview formats gathered, statistically analyzed were for knowledge stratified for the sector.

4.1 Data and Information Description

The data collected from the study on quality planning and capital budgeting derived was from the concepts of quality assurance from, Pareto analysis and chart, Gantt chart, NPV and IRR methods, and the Emerging concept. The results from these developments explain the position on the field and the way customers or the public assesses the sector on quality assurance. The determined theories follow as described. Also, the data for the study has been coded, and qualitative data processed into quantitative data for statistical determination. Furthermore, other information not processed as quantitative data described the processes and procedures developed as the recommendation for quality assurance. For ease of mathematical expediency, ascertained data are manually counted and coded. The results analyzed statistically are with Microsoft Excel. The responses interpreted were with Pie, Bar and Area charts from Microsoft Excel.

[4] Refer Blaxter et al. (2006, pp.80-87), Box 3.17, 'Developing reflexivity: some questions to ask yourself', Eight (8) considerations: 1. What do you need or want to find out? 2. What skills do you have? 3. Will your methodological preferences answer your questions? 4. How will your methods affect the answers you get? 5. How will you affect your research? 6. Which methods are acceptable? 7. Using more than one method. 8. Allowing for changes of direction.

4.1.1 Determining with Pareto Analysis/Chart

When drawing quality planning through to quality improvement, the concept of the Pareto analysis developed. The concept technically ascertained the problems in the sector for solutions determined at the planning stage before implemented. Through interviews done, the case data stratified for the sector was taken. From, analyzing with Pareto, when needed stock materials comprising of conductors and wooden poles were available, the time spent to complete minor development jobs, factoring in the scope of the job, was four (4) weeks (30 days) for a Contractor. However, where excavation works ensued, projects' right of way often resulted in litigation matters delaying capital projects, and as such increased the cost of the improvement. Therefore, in planning quality assurance capital projects, quality control should guide for quality results. These underlying developments give 80% problems, occurring as resulting from 20% control defects now ascertained for quality improvement. The concept as given prioritizes the quality problems for solutions, and the scoring lists the problems with their causes. From interviews done, the scoring was done for grouping and resulting ascertained as solutions for highest problems. The outcome indicated the severity of the problem to quality assurance and cost implication.

The quality problems were;

Table 8-4.1.1 Determining with Pareto analysis

No.	Problem	Cause	Score
1	Site issues leading to litigation	Right of way	11
2	Shortages and delay of project materials	Lack of stock materials	9
3	Failure on port/Defect encountered when transformers taken to field fails when energizing	Equipment failure	6
4	Readily non-availability of Boom-Truck (Equipment) for lifting transformer to site	Non-available of Heavy duty equipment vehicle	3
5	Outages/Pre-commissioning testing takes an amount of time and affects customers with complaints	Customers outages complaints on pre-testing commissioning	3
	Total Score		32

Therefore, in determining the Pareto chart from the analysis was crafted as;

Table 9-4.1.1 Determining with Pareto chart

No.	Problem	Cause	Score (Count)	Cumulative Count	Cumulative (%)
1	Site issues leading to litigation	Right of way	11	11	34.38
2	Shortages and delay of project materials	Lack of stock materials	9	20	62.50
3	Failure on port/Defect encountered when transformers taken to field fails when energizing	Equipment failure	6	26	81.25
4	Readily non-availability of Boom-Truck (Equipment) for lifting transformer to site	Non-available of Heavy duty equipment vehicle	3	29	90.63
5	Outages/Pre-commissioning testing takes an amount of time and affects customers with complaints	Customers outages complaints on pre-testing commissioning	3	32	100.00
	Total Score		32		

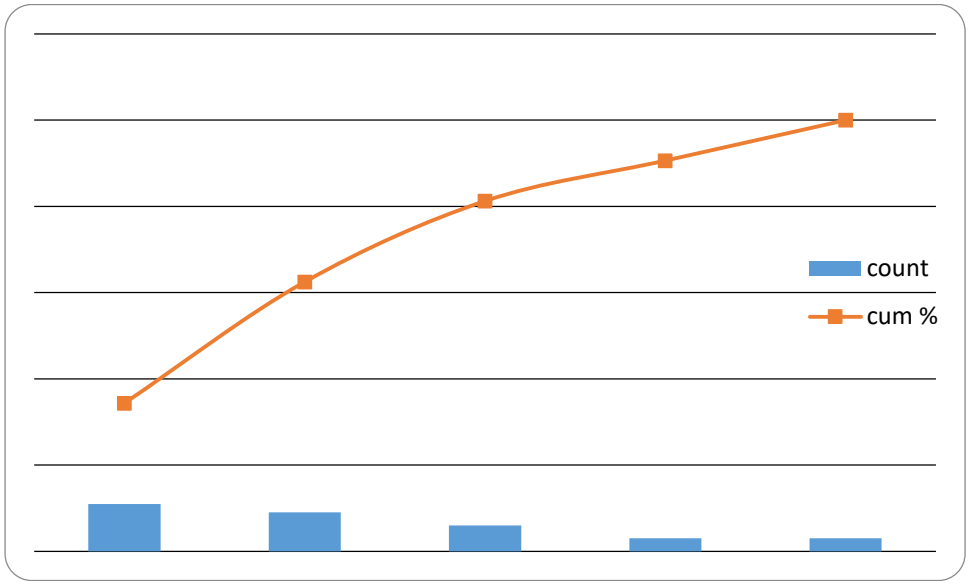

Figure 1-4.1.1 Analysis with Pareto chart with quality problems

In solving the right of way problem from Community leaders, as stakeholders having a great interest in the capital project, the behaviour of the Pareto chart developed as indicated below.

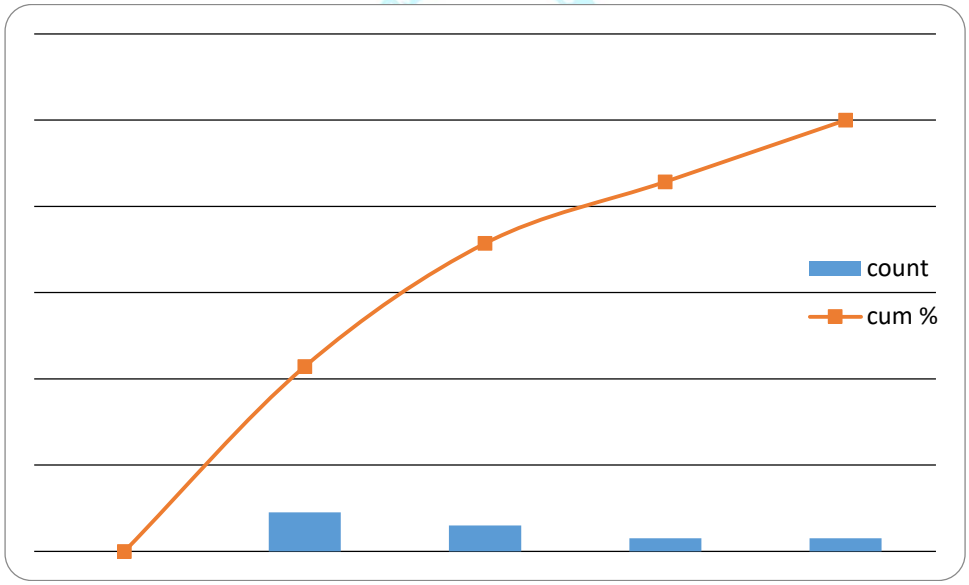

Figure 2-4.1.1 Analysis with Pareto chart for solving quality problems

In a nutshell, quite impressive but derives quality improvement aligning with costs, where Community leaders as capital projects stakeholders are costs leaders in the quality assurance.

4.1.2 Determining with Gantt chart

Interviews gathered identify that for achieved quality assurance within the stipulated time schedules, the problems defined by the Pareto analysis for solution purposely, the site litigation (right of way) for capital projects when cleared, the indication was that about 55% solution achieved have been towards quality results to the 20%. Therefore, there was no indicator to state that the schedule computed for determined proposed capital projects cannot be within the set time elements. There also have to be in the known that cost elements attached were to the determined

project, and, therefore, capital projects should not have any variance against the actual, as all things factored as equal. In furtherance, from the study's case stratified project was determined as follows, given Juran's trilogy, quality-planning, control and improvement as;

Table 10-4.1.2 Derived Project Schedule of Gantt analysis

Activity	Activity Description	Duration (days)
A	Planting of LV/HT Poles (scope- 5-10days)	10
B	Stringing of conductors (scope- 5-10days)	10
C	Mounting of Transformer (Equipment)	5
D	Inspection, Testing, and Commissioning	5
	Total	**30 days**

These outcomes are the planning and control quality tools for better capital projects. They have factored in the constraint time element of 30days as compared to the example determined of 28days, and the constraint element of costs, with valued output of quality. There were no cost elements shown from the Gantt chart, however, the important factor to determine cost elements come from the capital budgeting technique requisite for application to the quality planning. More so, the backbone on the Gantt chart result was from the Pareto analysis in solving problems that can easily ensue. Therefore, the Gantt chart analyzed from the table was developed as;

Table 11-4.1.2 Project analysis as of Gantt chart

Activity Description	Duration (days)	1-5	6-10	11-15	16-20	21-25	26-31
Planting of LV/HT Poles (scope- 5-10days)	10						
Stringing of conductors (scope- 5-10days)	10						
Mounting of Transformer (Equipment)	5						
Inspection, Testing, and Commissioning	5						

The Gantt chart to a larger extent portrayed quality capital projects when scheduled to develop informing the sectors' quality assurance capital decisions. Therefore, where the set controls are not working well, the identified capital budgeting technique of acceptance of the cost is a failure. In furtherance, quality improvement has to be introduced with additional cost implication. Therefore, the capital budgeting calculation is also a factor for consideration when scheduling the Gantt chart.

4.1.3 Determining with Capital Budgeting Techniques

From Juran's trilogy model, Pyzdek and Keller (2013, chpt. 2, online), determines quality planning from Juran and Gryna (1988) as the activity of developing the required products and processes in meeting the needs of the customer. Therefore, capital budgeting techniques of the DCF techniques of the NPV and IRR can be used to plan for a quality project. However, where these techniques do not give the right answers, the advanced techniques of the Monte Carlo Simulation and the Sensitivity analyses computations factor risks for results, and therefore could be used. Furthermore, the Emerging concept that marks-up risks in calculating for the NPV and IRR results, have an upper-hand when the required products and processes are being determined. In developing the knowledge on the identified techniques, the NPV as the DCF technique and the Emerging concept are determined as derived.

Determining with NPV (DCF Technique): The NPV is an investment appraisal technique for quality assurance decision for value to the customer and the investor, by accepting the decision of NPV > 0, and rejecting NPV < 0, for capital projects.

Therefore, control of cost and not to re-plan for improvement is an important work. The technique is determined by the formula, which subtracts the project's cash outflow from the present value, discounted at the pre-determined rate, the cost of capital of the business.

Therefore, determined as;

$NPV = \text{CF x } \frac{1-(1+i)^{-n}}{i} - \text{ IO}$

- where, CF = Cash inflow
  IO = Initial cash investment
  i = required rate of return
  ^ / n = number of periods

Furthermore, the defined formula is defined by the Microsoft Excel format in determining as;

Table 12-4.1.4 Determining with NPV

	Amount (GH¢)
cash inflow (initial inflow)	
discounting valuation: – [dv] (Excel Function gives; [=NPV(r, CF) ^ n=1year period for whole sum values.]	
add: cash outflow (initial investment) – [IO]	
NPV: (Excel Function gives; =dv + IO	
IRR	

The result due to quality assurance, the Emerging concept is further developed for the uncertainties realization.

Determining with Emerging concept: The Emerging concept determines quality assurance where the investment appraisal in calculating capital projects mark-up risks and uncertainties, for determinate results. Therefore, the result concluded that quality assurance from unforeseen contingencies factored was into the cost elements. From the underlying understanding, it was crucial to do quality control, where the identified acceptance was from the Top Management to the Shop Floor. The resultant was to negate the inflow of defects, and as such morality problems described as wicked problems do not ensue. However, the acronym of 'PESTLE' was the directional tool, where quality assurance was ascertaining from the Emerging concept of capital budgeting ensued. The Emerging concept further developed was from Juran's trilogy model on quality- planning and control for capital projects for value to the business owner. That is further derived as the business mindedness of the sector stratified. Therefore, quality improvement factoring the constraint elements of time, cost, and at the end of the day quality defects, rejects such inputs. In furtherance, all these as described align to the acceptance of quality capital projects of NPV > 0.

The functional formula in determining is as follows;

$c = ((1 + r)^{\wedge n_1} - \text{IO}((1 + \text{r})^{\wedge n})$

- where, IO = initial investment,
  r = interest rate (cost of capital)
  n = number of period
  CF = cash flow

More so, Microsoft Excel is used to determine the concept from Table 2-2.3.3, 'Determining Quality with the Emerging concept'. The development of the NPV decision rule mostly shows the value greater than zero, and where the IRR shows a value not greater than zero, then quality- planning and control have to be seriously determined from the Top to the Shop Floor to negate any quality improvement, an indicator of cost. In a nutshell, quality assurance determining from investment appraisal techniques give value to the customer and the investor, all things being equal, as determined.

4.2 Context Of Research Sites

In bureaucratic systems aligned to the sector stratified, the requisite processes of going through the HR department for clearance has been followed, with the formal introduction letter from the University. However, the study from the sectors' appreciation skews more towards Engineering for data collection and interviews. Planned meetings scheduled were for interviews, distribution and collection of survey questionnaires. Furthermore, limiting factors ensued in not

capturing the total sample size of 150, but 104 representing 69.33% indicates a healthy sample size for the study. Also, interviews also planned for 40population had 24 representing, 60% for the study. Therefore, both percentage values represent 100% responses for the analyses of the study. The results from the responses are interpreted from the representations from the tables and line charts with Microsoft Excel 2007.

Table 1 Responses as of Survey questionnaires

Respondents	Responses	Percentage (%)
Managers	24	23.08
Supervisors	48	46.15
Direct Reports	32	30.77
n=	**104**	**100**

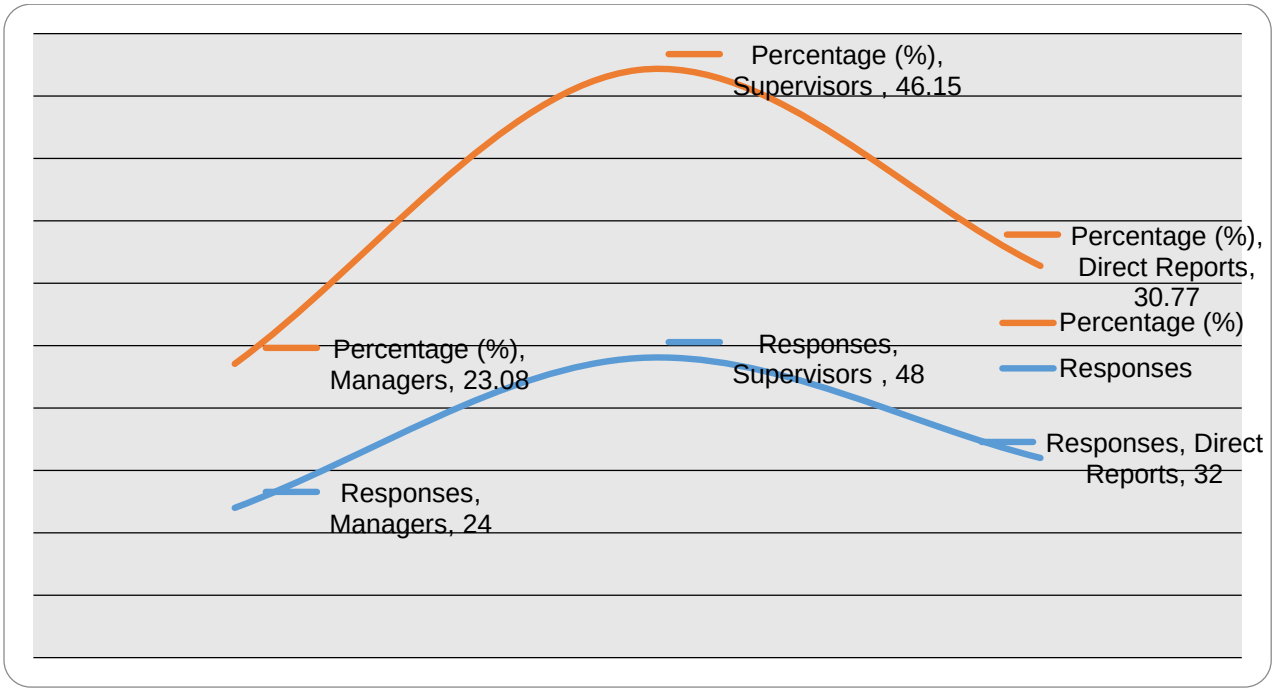

Figure 1 Analysis as of Survey Questionnaire Responses

Table 2 Response as of Interviews

Respondents	Responses	Percentage (%)
Managers	4	16.67
Supervisors	12	50.00
Direct Reports	8	33.33
n=	**24**	**100**

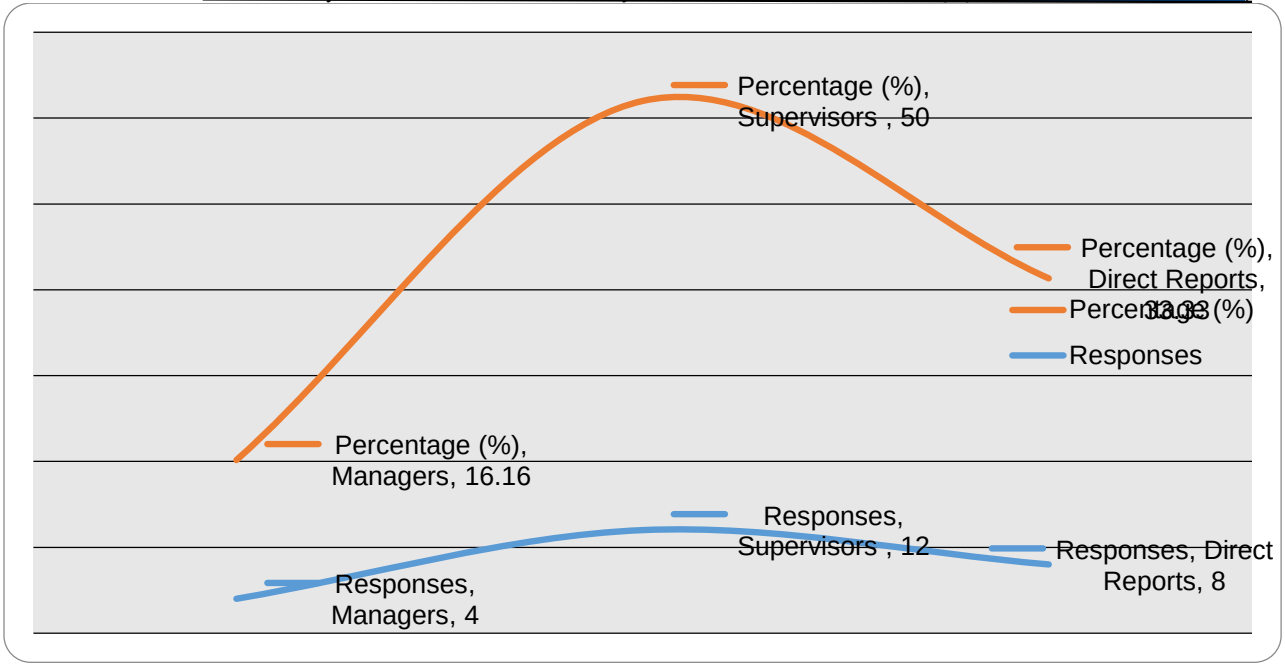

Figure 2 Analysis as of Interview Responses

4.3 Analysis of the Questionnaires

The survey questionnaires determined were from the probability sampling method stratified for the sector. The achieved data manually counted and statistically determined with Microsoft Excel functions and charts represents as follows.

4.3.1 Analysis of Demographic Data of Respondents'

The role in quality decision making of respondents was analyzed with the table and figure of pie-chart as follows;

Table 3 Quality Decision-making role

Activity	Frequency	Percentage (%)
Managers	24	23.08
Supervisors	48	46.15
Direct Reports	32	30.77
n=	**104**	**100**

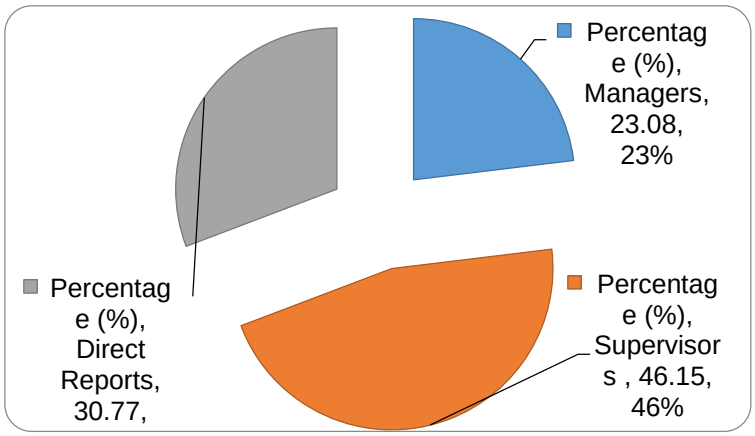

Figure 3 Analysis of Quality Decision-making role

The results on quality decision-making roles indicate the appreciation of quality for the sector.

4.3.2 Existence and Importance of Quality Planning Systems for Capital Projects

The study in determining the existence and importance of quality assurance systems in capital projects decisions, develops as measured. The results achieved answers the problem questions, research questions and the primary and secondary objectives of determining quality assurance from the sector. The results are shown from the table and area-chart as indicated.

Table 4 Quality Assurance Systems existence

Assessment	Frequency	Percentage (%)
Strongly agree	32	30.77
Agree	56	53.85
No idea	16	15.38
Disagree	-	-
n=	**104**	**100**

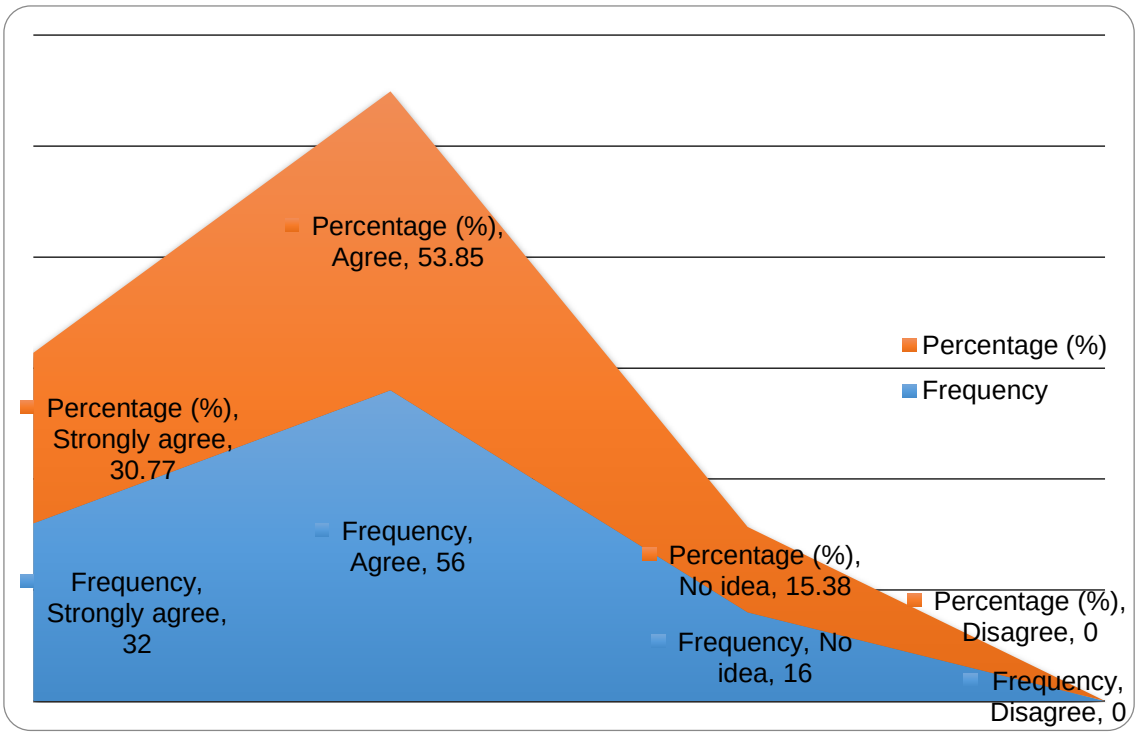

Figure 4 Analysis of Quality Assurance Systems existence

In carrying out the assessment of the importance of risk and uncertainties in capital projects decisions on quality assurance systems, the results answered an objective of the study.
The results developed were as indicated.

Table 5 Importance of risk and uncertainties

Assessment	Frequency	Percentage (%)
Strongly agree	16	15.38
Agree	88	84.62
No idea	-	-
Disagree	-	-
n=	**104**	**100**

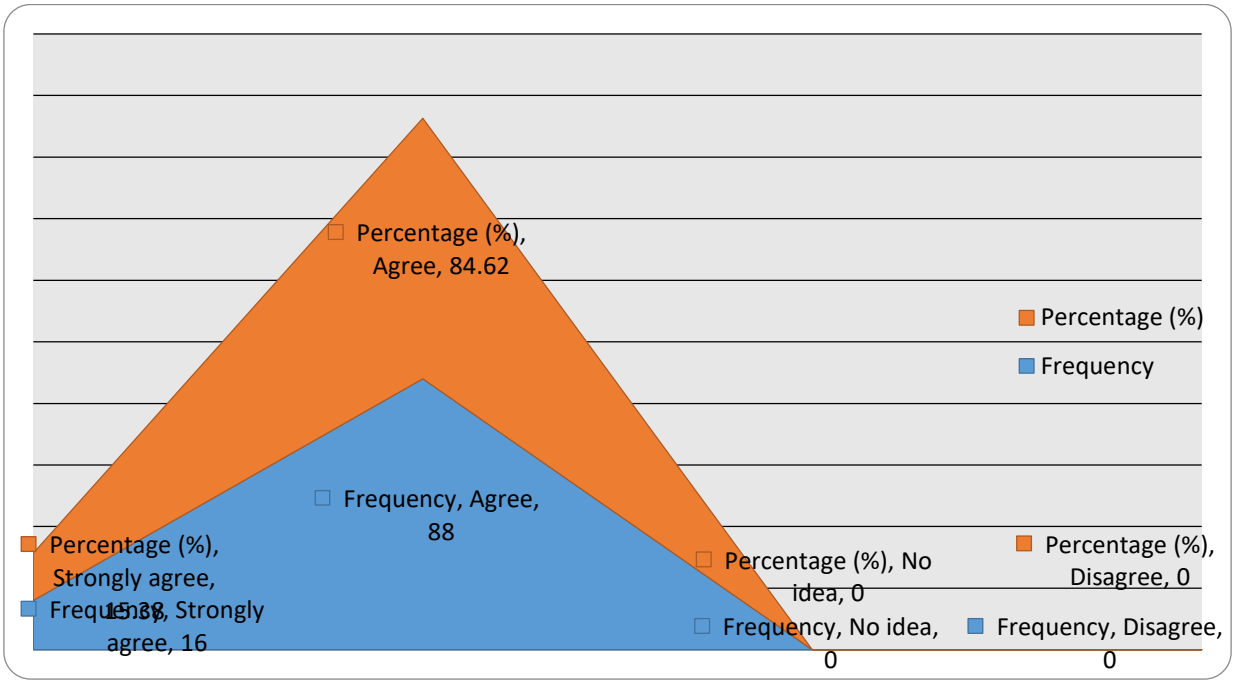

Figure 5 Analysis of Importance of risk and uncertainties

The survey questionnaire answers the importance of quality assurance systems in capital projects decisions. The theory of morality on decisions on capital projects is factored. The 5 point Likert scale rates from one (1) lowest to five (5) the highest indicates as following.

Table 6 Rating Importance of quality assurance systems

Rating	Frequency	Percentage (%)
1	-	-
2	24	23.08
3	-	-
4	32	30.77
5	48	46.15
n=	**104**	**100**

4.3.3. Existence and Relevance of Capital Investment Appraisal Systems for Quality Assurance Capital Projects.

In answering the research question on this stead, the answers favourably determine from the tables and bar-charts as following. To a larger extent, the hypothesis developed was answered.

Table 7 Standard quality assurance financial systems

Assessment	Frequency	Percentage (%)
Yes	67	64.43
No	21	20.19
Non	16	15.38
n=	**104**	**100**

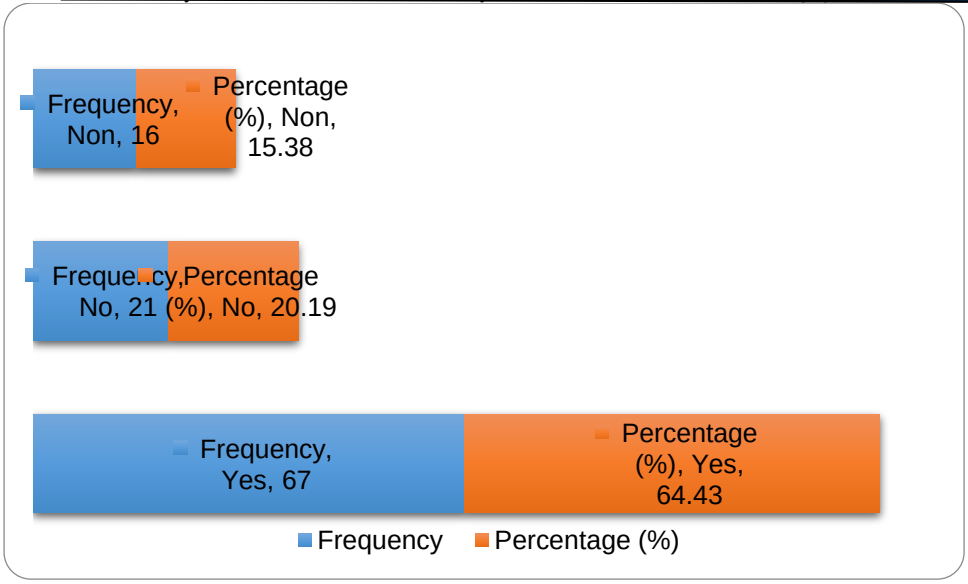

Figure 7 Analysis of Standard quality assurance financial systems

4.3.3.1 Determining the Hypothesis

The hypothesis was determined from the analysis of the standard quality assurance financial systems, table 7, concluding with the results of yes of 64.43%, No of 20.19% and Non is 15.38%.

The hypothesis declares as;

- N_0 - 'projects' in the sector does not determine quality assurance'.
- N_1 - 'projects' in the sector does determine quality assurance'.

The results were tested from the chi-square computation as;

- Chi-square test statistic = 6.85
- Chi-square critical value = 9.49
- Alpha = 0.05
- Degree of freedom (df) = 4
- P-value = 0.14

The conventionally accepted significance level, is where $p \leq 0.05$ (alpha α), rules the decision at 95% confidence interval of not acceptance to chance, and that the result determined showed as 'not significant' at $p > 0.05$. The computation is at Appendix 4. The relevance of the financial systems the sector used in quality assurance, for capital projects decisions was rated on the 5 point Likert scale. The rating was from one (1) lowest to five (5) the highest. These are the tools that control the costs of the sector, and that impact on quality planning. In ascertaining the relevance of the sectors' financial system, the answer to the hypothesis concludes.

Table 8 Rating Relevance of sectors' financial systems

Rating	Frequency	Percentage (%)
1	-	-
2	16	15.38
3	-	-
4	56	53.85
5	32	30.77
n=	**104**	**100**

The results achieved in determining the system for calculating projects' timelines for capital projects, stratified for the sector answers. It establishes, to a larger extent, that, there were systems to effect that decision for quality assurance, concerning value. The results as derived concluded on answering the hypothesis.

Table 9 Systems for calculating projects' timelines

Financial systems	Coded	Frequency	Percentage (%)
Own system	AO1	72	69.23
Recognized Financial Method	AO2	24	23.08
Non	AO3	8	7.69
	n=	**104**	**100**

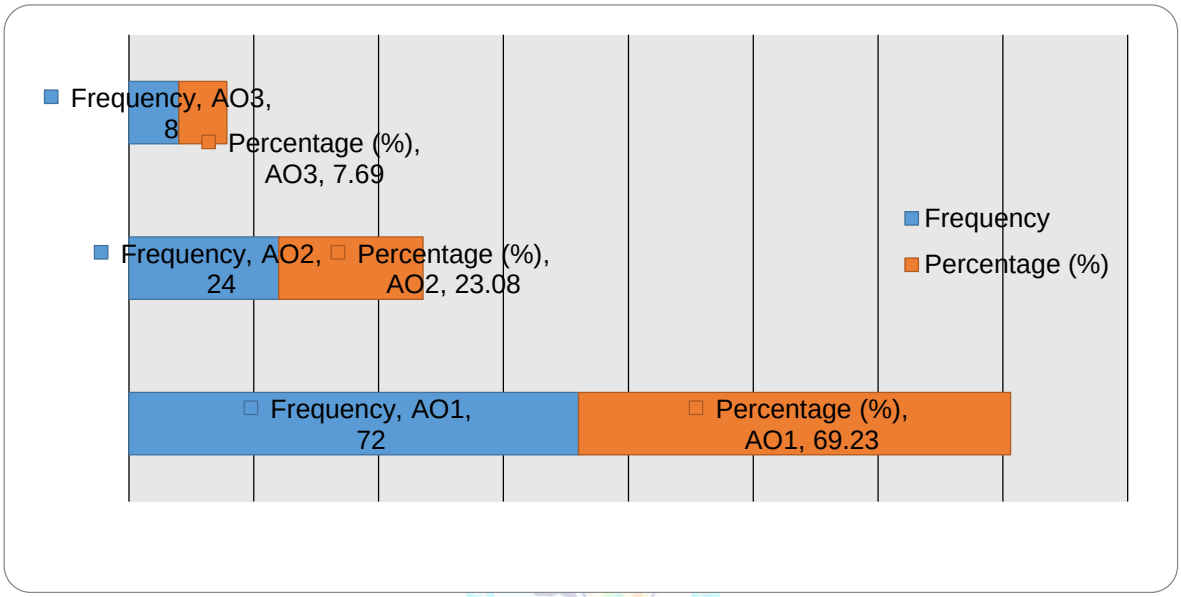

Figure 9 Analysis of Systems for calculating projects' timelines

In ascertaining the quality assurance method stratified for the sector, the research question on, identifying the quality assurance theory from the sectors' investment appraisal for value for the general public, was answered.
The results showed as indicated, and the recommendation ensued.

Table 10 Ascertaining Quality Assurance method

Quality Method(s)	Coded	Frequency	Percentage (%)
Kaizen	BO1	-	-
TQM	BO2	32	30.77
Juran trilogy method	BO3	-	-
Other(s)	BO4	56	53.85
Non	BO5	16	15.38
	n=	**104**	**100**

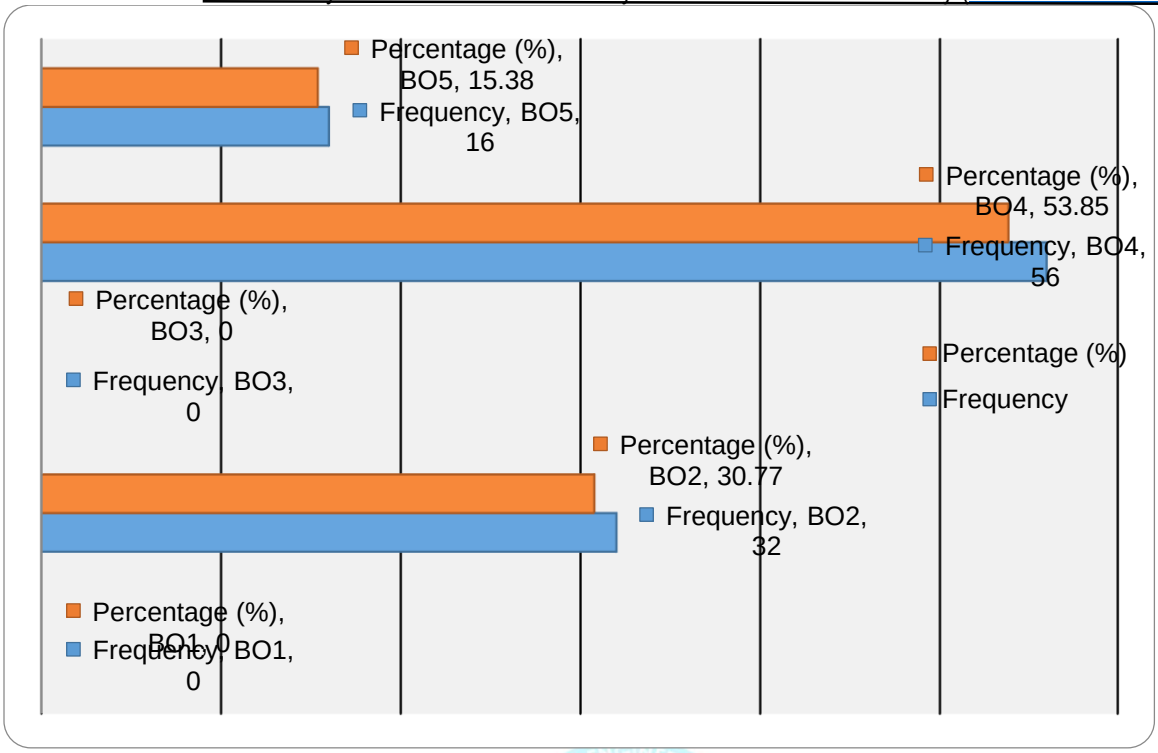

Figure 10 Analysis of Ascertaining Quality Assurance method

4.4 Conclusions from Questionnaires

The data from survey questionnaires were statistically determined into valued results answering the objectives, problem statement, research questions and the hypothesis of the study. The results extracted were from;

- Existence and Importance of quality planning systems for capital projects, and
- Existence and Relevance of capital investment appraisal systems for quality assurance capital projects.

In a nutshell, the existence and financial computation of quality assurance in capital projects decisions occur from the gathered results.

4.5 Analysis of the Interviews

The interviews granted were analyzed from concluding the Pareto analysis and chart into ascertaining problems from the field to quality assurance. These problems had an effect on the Gantt chart on scheduled timelines. They ensued;

- Litigation from landowners (Right of way),
- Lack of readily available project materials,
- Defective Equipment(s) sent to site, and, as a result, fail 'on port', when pre-commissioning these equipment(s),
    - There were lesser means of testing such equipment(s) before sending them to project sites only to fail, after completing the project. These were problems to quality assurance.

The study recommends dummy set-ups for such facilities.

- Also, the Heavy Equipment(s) have to be lifted, and transported to the project sites. However, the mode of transportation can delay.

As such, in solving these problems, Top Management bureaucratic processes ensuing should be fast-track to reduce delays in design plans.

Furthermore, in ascertaining quality methods in the field, the outcome skews much to,

- Standards of operations,
- Safety and processes guidelines in operations,
- Training/Seminars on TQM, and
- In determining scheduled timelines for projects, the scope of the job is the prime scheduling factor.

In capital projects, moral issues occur, and however, the systems correct these practices, as the projects ensue.

4.6 Conclusions from Interviews

The interviews done facilitated in developing solutions for the problems ascertained from the,

- Pareto analysis and chart, and
- Gantt chart.

Furthermore, conclusions to the Emerging concept further determined from quality assurance to capital projects. The quality cost control aligns from the problems ensued, and they should have investment appraisal methods aligning to the same understanding terms. In a nutshell, the gathered interviews on quality assurance, from the Juran's trilogy model on quality- planning, control and improvement, impacts on capital budgeting for value to the customer, and the business owner.

5.0 EVALUATION OF THE RESEARCH

The assessment of the study impacts quality planning on capital budgeting, with the use of Juran's trilogy model, answers critical research questions with requisite primary and secondary objectives. The achieved results analyzed were into determining statistically answers on the problem statement and hypothesis.

5.1 Summary

In summary, the study ensues as following; the background of the study gives the snapshot of Managers, given contracts to perform for profitability for the business owner. However, quality planning does not matter, as cost/benefit analysis for quality improvement with cost solving quality problems of higher results tends to ignore quality with morality issues. Therefore, the psychological and socio-religious philosophy of 'moral, amoral and immoral' values, are determined as wicked problems. These problems, with Pareto analysis, showed them as 80% to be solved with 20% decision plans to merit quality results of 80% output. Also, the problem statement of, capital budgeting impact of quality planning, when Juran's trilogy model determined was from the sectors' duties, determining quality planning and assurance influencing capital projects decisions, determining the human resources of the sectors' appreciation to quality assurance decisions.

More so, the primary and secondary objectives focused on, the sectors' notion of quality planning and capital budgeting, Juran's trilogy model has analysis to the sector, Quality planning impact on capital budgeting, and determine the sectors' quality assurance model. The main limiting factor was the subject matter of capital budgeting to the topic area of quality planning for the sector. The drive to the study's population merited from this understanding. From the ensuing, the hypothesis was statistically computed, the results identified as 'not significant' at $p > \alpha$, of 0.05 with the p-value of 0.16. Therefore, the hypothesis, N_0 = 'projects' in the sector does not determine quality assurance', the study failed to reject it.

5.2 Findings and Discoveries

The results of the study statistically determined and from interviews indicated from the research questions as; can quality – planning, control and improvement as Juran's Trilogy model be used to analyze the capital investment decisions of the sector? The study realized that Juran's trilogy as a model can be used to analyze the sector stratified. The limiting factor or problem, as was determined from the Pareto analysis on capital projects, showed that quality control needs much attention. The neglect of the quality control ensues the constraint elements of time, cost and quality.

What are the input systems in Capital Projects, determining the existence of risks and uncertainties, and capital appraisals? The theory relating to morality and ethics in decisions are determined. The output results determine the input from Pareto's 80/20 rule. In reviewing the appreciation of quality assurance to capital projects, morality was cited. The outcome indicated that, when capital projects are ongoing, there was no system of morality. When problems of the 'right of way' for projects ensue, community leaders, described as projects stakeholders consulted are for redress, and also project re-design done. However, the appreciation of the constraint elements of time and cost, determined on the Gantt chart was not purposed as a schedule in the sector.

Does the use of the sector's investment appraisal consider quality assurance or value for the general public, inputting a Quality Assurance theory? In determining the investment appraisal method as a quality assurance standard, the hypothesis was determined, resulting in a 'not significant' test statistics from the $p > \alpha$ (alpha of 0.05).

5.3 Limitations

The limitations declining the study drawn are as follows; in determining the margin for the study's population, capital budgeting impact from quality planning defines, and not from outside the margin. Furthermore, in determining the understanding of quality planning from Management viewpoint, to capital budgeting from Financial Management viewpoint, the understanding of the concept's target respondents is the issue. The fear of the uncertain from investigative journalists to the sector gave doubt for the use of the sectors' data. Therefore, granting of an interview with recording systems was not allowed. Also, the sector's bureaucratic system delayed processes. The limiting factors although not complete, the study's completion was of many endeavours for an intellectual accomplishment.

5.4 Recommendations

The study intends to recommend as follows; the sector in capital projects decisions, problems should be itemized for quality solutions. The Pareto analysis and chart recommended were for analysis in the sector, in determining the 80% quality problems with the 20% quality solutions for the achieved 80% quality results. In recommending the Pareto analysis, Juran's trilogy model of quality- planning, control and improvement must be factored into all capital decisions. The outcome was to determine that in the quality planning of capital decisions resulting in costs, the sector introduced quality control from the Top Management. That, in the end, failure will not occur for quality improvement as a cost to be determined. In performing financial modelling, the functional formula from the Emerging concept is recommended. The indicator is to identify, and workout risks and uncertainties into the constraint element of cost in the quality planning, and attain the business-mindedness of the sector. The suggested functional formula developed from; c = ((1 + r) ^ - (risk + uncertainties)) ^ where, uncertainties = 'non-financial consideration' from political influences on projects, court actions, litigations, chasing project workers with knives, matches, and arms at project sites/lands. The functional formula now determined is as shown, and with Microsoft Excel having the basis computation from NPV and IRR as;

Table 13-5.4 Derived Functional Formula

$c = ((1 + r)^{\wedge}n_1 - \mathrm{IO}((1 + \mathrm{r})^{\wedge}n)$ where, IO = initial investment,
r = interest rate (cost of capital)
n = number of period
CF = cash flow

Table 14-5.4 Derived Emerging concept - Microsoft Excel

	Using Excel functions
cash inflow (initial inflow) [CF]	
discounting valuation – [dv]	=NPV(r, CF)^ n=1year period for whole sum values.
add: cash outflow (initial investment) – [IO]	=IO - ((1+r) ^n)
NPV	=dv + IO
IRR	=IRR(dv : IO [range],r)
interest rate [r] / number of period [n]	

In quality planning decisions, impacting on capital budgeting, cost elements ensue, and for the customers to align to the decisions, behavioural tendencies must be factored. These ensue from; Socio-cultural impact, and Higher dignitaries' patronage. In quality planning, ethical consideration relating to morality needs to be factored. Therefore, the wicked problem of non-quality services trade-off, with human-lives on capital decisions, such as capital projects should not be encouraged.

5.5 Further Study and Research

In the consideration of further study and research areas from the study as ascertained, the constraint elements of time, cost and quality determines the value to the business owner. Therefore, An empirical study on Quality Control in determining the behavioural inferences on construction projects in an organisational setting or sector of a country. Assessing the financial recovery for social and economic projects in an organisational setting or sector of a country. An empirical study in determining the cost of Quality Control of an organisational setting or sector of a country. The

developed areas for further study and research, to a larger extent, will give a valuable finding and discovery to academia and country-wide benefit.

5.6 Conclusions

In concluding the study, the areas that impact investment appraisal from quality planning was; The hypothesis with the result of 'not significant', failed to reject the null hypothesis, with the meaning that, data gathered were not sufficient to substantiate accepting the alternative hypothesis. The conclusion was that the sector needs to work on quality assurance through, Training of manpower on, Quality Models and assurance standards for the sector, Ethical considerations on capital decisions for the sector. Standard investment appraisal tool that determines quality assurance decisions on capital projects.

Top Management given, should have targets on Quality Control, from where constraint elements of cost, time and quality determined. The officers given such control performances have to be held accountable for neglects. Furthermore, the recommendations suggested have to be given proper attention to the concept of quality planning to achieve its aim.

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