Investigation into the Impact of Project Management Models Using Capital Budgeting tools as a Benchmark in Public Sector Organizations in Ghana

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Abstract

The study would, 'investigate into the impact of project management models, using capital budgeting tools as a benchmark in public sector organizations in Ghana' (the sector). Capital budgeting ascertained would be the longlived expenditures for capital projects, over a defined period that would be with certainty, with the aim of claiming back the cash injections over a period with value earnings. The case study stratified data, would calculate the NPV and IRR to deduce the capital budgeting tools, and further determined with the Emerging concept for markup regarding projects in risk and uncertainty environments ascertained with certainty. The impact of project management models identified would be the Critical Path Method (CPM) and the Gantt chart. The study would grant an interview, and the Gantt chart would determine graphically the results of the interview on planned and controlled projects. The study would develop the null hypothesis of, 'the sector does not have capital budgeting tools that serve as a benchmark with impact from project management models'. That would be used to guide the test statistics decision rule at the confidence level of 95%. In achieving the decision-rule for the hypothesis, there would be the problem statements and research questions. The outcome would be the null hypothesis and risks, determining from survey questionnaires and interview questions responses for data analysis. These would derive from the proportionate stratified random sampling method. An academic input would be derived from an article on the subject matter that would be reviewed, critique, and an academic opinion given. The study would conclude with various recommendations. The training for the human capital of Managerial positions resourced would be with financial and project management concepts for viable capital projects decisions, with a derived model for value for the sectors' consideration.

Keywords: Project Management Models, Capital Budgeting, Project Benchmark

1.0 INTRODUCTION

The study would be on the topic, 'investigation into the impact of project management models, using capital budgeting tools as a benchmark in Public Sector Organizations in Ghana. From this subject matter that the underlying concept of Capital Budgeting tools ascertained would be as the resourceful allotment techniques used in long-term assets' strategic project decisions, assigned with requisite substantial funds of organizations. The capital budgeting techniques identified would also be the organizations' determinants in value for influencing the investors' dream of profit earning and growth. However, it would be further identified that there would be the industry's negativity arising from risks and uncertainties that the techniques mitigate, when computing future profits. The risks and uncertainties factored would mostly be into such computations for the future profit earnings. Therefore, the earnings would show the unforeseen contingencies, which would readily crystallize along the way when due diligence taken would not be fruitful.

Furthermore, capital budgeting decisions in public sector organizations in Ghana would have projects with substantial financial implication decisions of which the underlying theoretical concepts unearthed, would depict the application of models not recognized. In ascertaining their worth, the impact of project management models identified would be used. These would come from the '4-D project management model' derived from 'Define, Design, Develop and Deliver'. Also, 'the PRINCE2 (PRojects IN Controlled Environments, version 2) model known for delivery of successful projects' would feature. Furthermore, the 'McKinsey 7-S model' of 'shared-value, strategy, structure, systems, staff, style and skills', would be also used to examine with the capital budgeting tools. The capital budgeting tools would be the Non-Discounted Cash Flow (non-DCF) of the Payback Period (PBP), Accounting Rate of Return (AROR/ARR) and Profitability Index (PI)¹. Also, the Discounted Cash Flow (DCF) of Net Present Value (NPV), and Internal Rate of Return (IRR) as derived by Hill (2005, p.31). Furthermore, from Hill (2005, pp.55-104) the other tools would be, 'decision trees, sensitivity, and computers, the value of debt capital and capital cost'. Also, the 'weighted average cost of capital, the concept of economic value added and the market value added'².

¹ See Ivan (2005, pp.122-124), 6.3.1 'The payback period', 6.3.3 'The Accounting Rate of Return' and that of 6.3.4 'Profitability index', which has in-depth analyses.

² See Hill (2005, pp.55-112), the theoretical concepts have been expounded for analysis,

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From the discussions done, the public sectors' activities about projects would be defined. The concept would use the Project Management Institute's (2008, p.5) definition as, 'a project is a temporary³ endeavour undertaken to create a unique product, service or result'. These unique product or services would have substantial derived project management constraints of cost, time and quality in risk and uncertainty environment implications that capital budgeting tools used would be in ascertaining their certainty. The project's lifecycle of initiation, planning, execution, controlling and completion with the project tools and techniques such as the Gantt chart, network analysis, and Pert/Scenario planning would have notable conceptual understanding. These concepts would relate to the capital budgeting tools as a benchmark for the valuable strategic decisions taken. The Project Management Institute (2008, p.6) further defines, 'project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements'. The study would have a focused ethical consideration driving from ethical, conceptual frameworks, and theories of academic progress and guide for data collection.

The study would also have the requisite sample population in deriving the required sample size for the study, with the methodology inferring from quantitative and qualitative methods. The stratification random sampling method would be used. The questionnaires, interviews and observation on the concept would give the requisite primary and secondary data for the analysis. The intended research questions notable would ensue as; can project management tools facilitate in giving the investor the required value, from the projects of the public sector organizations in Ghana? Can capital budgeting tools be used as a benchmark for examining project management models of public sector organizations in Ghana? What are the project management and capital budgeting models employed by the public sector organizations in Ghana? The reasons for the establishment of public sector organizations would be discussed to substantiate the intended answers to the questions put forth. For classifying by structure⁴ for the intended study would indicate as; The Central Government, comprising of the President, Ministers, Parliamentarians, Permanent and non-Permanent sections of the Ministries, Departments and Agencies (MDAs), Local Government, consisting of the Metropolitan, Municipal and District Assemblies (MMDAs), Public Corporations, comprising of the following; statutory public, commercial organizations solely owned by the government for the purpose of business activities, having a quantum of independence for financial and operational arrangements, also, statutory public, commercial organizations jointly owned by the government and private partners with the feature of a limited liability company. Statutory Boards and Authorities, comprising of specialized services that have been realized to be economically unattractive to enter for profitable gains.

In obtaining the required answers that would be for the intended questions from the survey questionnaires crafted from the primary and secondary data, that figures and tables would be statistically derived as the results. The in-depth intended questions would further result in the derived hypothesis, and processed with test statistic of 95% confidence interval and quality planning computations for the hypothesis results. The results would indicate the impact from investigating project management models, determined from the case study stratified data that would determine with the Gantt chart. Also, with the use of capital budgeting tools as a benchmark would determine with NPV, IRR and the Emerging concept for certainty in public sector organizations in Ghana. Also, the results would be a further study and research for the Corporate Financial Management World. Therefore, the investors' dream, to 'increase corporate profitability and hence value' Hill (2008, p.28), would be identified. In consideration of these outcomes, the public sector organizations' setup of a different objective socially and economically, would be acknowledged.

2.0 LITERATURE REVIEW

The literature review on the topic, 'investigation into the impact of project management models, using capital budgeting tools as a benchmark in the sector', would review various studies on project management models and frameworks and capital budgeting techniques. The underlying principle for the benefits of the models would be to derive the 'expected values' Ivan (2005, p.133) of which investors would earn for by injection of substantial cash. The review would give an appreciation of the concept of the foundations, through developments and different theories, to historical thinking of the study.

2.1 Foundations of Capital Budgeting Tools

The foundations of the study developed into that of project management, and capital budgeting tools would be derived as reviewed. The foundations study of capital budgeting tools would derive from the concept of decisionmaking. The principle would ascertain as, 'a process of weighing up the costs of the investment against the benefits it

³ See PMBOK Guide, (PMI, 2008, p.5), 'The temporary nature of projects indicates a definite beginning and end'

⁴ Refer to the 1992 Constitution of Ghana, Chapter 14, for appreciating the system with other LIs (Legislative Instruments).

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promises, all in present value (PV) terms. If the benefits outweigh the costs, then the investment would be a worthwhile undertaking' derived by Ivan (2005, p.115). From the decision-making concept's understanding, that financial economists would distinguish investment into real and financial investment. Therefore, the real investment would be, 'the purchase of (productive) capital equipment by a firm in the hope of increasing the value of the firm, typically via an increased stream of future profits' Ivan (2005, p.115). Also, the financial investment would be, 'the purchase of a financial asset in the hope of a future income stream via dividends (in the case of equity) or coupons (in the case of bonds) and a possible capital gain (in the case of all financial assets)' Ivan (2005, p.116). These underlying theories would facilitate in giving real investment's stand from capital budgeting.

Furthermore, in trying to ascertain the foundations of capital budgeting, investment projects would be classified from the fundamental concept. These would be, 'a series of cash inflows and outflows, typically starting with a cash outflow (the initial investment outlay) followed by cash inflows and/or cash outflows in later periods (years)', Götze et al. (2008, p.3). The consideration of cash flow would have a basis for capital budgeting, from cash inflows as cash receipts from equity and debts. The cash outflows would be the expenditures incurred for activities that facilitate in achieving a capital asset, and its valued outcome resulting in the investors' big dream of wealth maximization. In driving to this destination, would advance requisite financial tools that would be for strategic investment decision-making, for the 'accept/reject' result. The realized cash outflows would be in capital assets and projects noted as strategic investment decisions in the form identified by Ivan (2005, pp.116-117)⁵ of,

- Replacement projects,
- Expansion projects,
- Diversification projects, and
- Other projects ('that do not fit easily into the other categories')

These identified strategic investment decisions defined by Götze et al. (2008, p.4), as the classification of investments⁶ being,

- 'Foundational investment,
- Current investment,
 - Replacement investment,
 - > Major repair or general overhaul investment
 - Supplementary investment,
 - Expansion investment
 - Change investment (e.g. rationalization, diversification)
 - Certainty investment.'

These bases would result in identifying when taking the strategic investment decisions, with other theories such as risks and uncertainties. These decisions derived would, therefore, be with models in the form of capital budgeting tools of Non-DCF, DCF and other sophisticated models for computing the best result for the investor. The basis of capital budgeting crafted from the real investment mode would be the real decisions that requisite capital budgeting tools would compute the right result of worth generation. The real investment identified by Ivan (2005, p.115), 'from a pure finance perspective, such capital expenditures are characterized by their irreversibility and the long-term nature of the prospective benefits.' For the investor, the decisions would have to be scientifically derived and evaluated. Therefore, 'for appraisal of an investment to take place in a scientific manner it must be possible to measure both costs and benefits in quantifiable terms,' Ivan (2005, p.115). These terms would be the result achieved by computation with the capital budgeting tools. The required outcome would be for implementation into the future with a positive degree of certainty of higher returns on the capital invested.

The capital invested from a positive result scientifically computed signifies that the returns, if the cash injection would be a debt would have a higher appreciation of paying off the debt. Also, an expectancy in the form of risks and uncertainties from the environs that would reduce the cost of the capital also computed, and the final return as profit for the investor, all things being equal. In considering the expectancy, the capital budgeting tools for calculating the result would have to be re-considered. According to Götze et al. (2008, p.3), 'the investment appraisal methods mainly differ in the way they transform cash flow from different years, the target measure(s) they use as the decision criterion, and the assumptions they make'. The assumption would indicate that, when time value for profit would come forth for profits, it would be valued decision taken. In result, time would be a tool identified when crafting the basis of project management.

In furtherance from capital budgeting from the cash outflow conclusion, even though 'people-related agency issues have attracted significant research efforts' indicated by Haka (2007, p.699). The rightful managerial tools such

⁵ See Ivan (2005, pp.116-117), for the discussion of the theories on the projects.

⁶ See Götze et al. (2008, p.4), Figure 1.1: Classification of investments, for the in-depth concept.

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as planning, motivation and controlling computed as uncertainties 'arise due to an inability to predict external marketrelated instabilities and internal firm-related factors', Haka (2007, p.699). Therefore, projects formed from strategic investment decisions would have the rightful capital budgeting tools in achieving the valued result. From studies derived by Haka (2007, pp.716-717) from, 'Organization Research and Environmental Research', the obtained outcome would show the basis of cash outflow from requisite strategic decisions. The principle would come with the computations ascertained from the varied capital budgeting tools. The results of the various research appreciate the basis for the use of financial tools in decisions that would develop amidst the complexity of uncertainties. In a nutshell, the basis of capital budgeting would identify facilitates in valued results that would capture for projects.

2.2 Development of Capital Budgeting Tools

The derived capital budgeting development through the times would be from the Figure 2 with the heading 'Evolution of capital budgeting techniques and processes and related research', Haka (2007, p.722). The developments through the periods from the 'Panel A: Pre-academic research' of Haka (2007, p.722) would develop as follows; 'the era before 1850 – Early use of discounting – compound interest confirmed to actuarial estimates and financial instruments.' However, Segelod et al. (2011, p.165) identified, 'by the 14th century Italian Merchants were using the DCF techniques always to calculate discounts for buyers who paid in advance (Parker, 1968).' The study would acknowledge that mathematicians were using compound interest from the era of the Babylonians. Actuaries further used the techniques of discounting for computing human lifespan, 'as the DCF technique saw in insurance and financial transactions' discussed by Segelod et al. (2011, p.165). '1850 – Industrial revolution creates productivity growth and formation of large corporations'.

The era identified with 'the railway boom in 1846-1848, it "accounted for debt half of total investment in Britain and a labour force of 250,000 people working on construction" (Freeman & Louçã, 2001, 197), as indicated by Segelod et al. (2011, p.166). '1875 – Proliferation of multi-divisional, non-owner managed firms'. According to Segelod et al. (2011, p.166), 'to manage these large workforces, by the 1870s some firms had already developed a multi-divisional structure'. Their markets and products had similarities that facilitated in grouping them together. The decisions taken were 'delegated to divisional level', Segelod et al. (2011, p.166) for redress.

- '1900 Economists recognize and advocate present value techniques for capital investments'.
 - '1925 A few firms began using ROI and present value techniques'.
- '1950 to 1975 Practitioners, Consultants, Courts, Institutions and even academics begin advocating DCF techniques'.

From the period unspecified to the 1975s saw series of developments from cash injections into decisions, most often calculated with tools like the compound interest and some DCF techniques identified. The 'Panel B: Academic Research'⁷ spans from the 1950s identified as 'DCF research & diffusion' through to 2000 as the 'inter-firm research'. It would further identify with the 'Figure 1, 'Diffusion of DCF techniques'⁸ survey. The development of the study of capital budgeting has passed through series of test with models for decisions taken on the sophistication of the times. The outcomes identified during and after the Second World War, with computer technology with huge mainframes to the 2000s with the advancement in technology in communication and speed showing a significant turn of events, amongst the labour force within the period.

2.3 Different Theories

The theories relating to capital budgeting and project management classified, would be from the ancient Babylonia and the Stone Age era with different theories meted out. Capital budgeting has theories as reviewed while that of project management has standards set out by the Project Management Institute. Therefore, under these developments that the concepts of capital budgeting and that of project management from different theories would come forth reviewed.

2.3.1 Different Theories for Capital Budgeting

According to the National Audit Office, (NAO, 2011, p.1), 'financial management is the system by which the resources of an organization's business are planned, directed, monitored and controlled to enable the organization's goals to be achieved'. The determining outcome of interest would indicate the organization's objectives. Also, Paramasivan and Subramanian (2008, p.3) develops, 'Howard and Upton: Financial management "as an application of general managerial principles to the area of financial decision-making". Furthermore, 'Weston and Brigham:

⁷ See Haka (2007, p.722), for the figure identified and diffused through the period.

⁸ See Haka (2007, p.705), DCF Usage Survey, 'Figure 1, Diffusion of DCF techniques', deriving the use of the model by researchers in United States Companies.

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Financial Management "is an area of financial decision-making harmonizing individual motives and enterprise goals" Paramasivan and Subramanian (2008, p.3). From the definitions of financial management, the obtained objective developed by Paramasivan and Subramanian (2008, p.5) would be for 'profit and wealth maximization', of which would ascertain from decision making.

From the understanding that the theories on capital budgeting would show when defined. The Dictionary of Financial and Business Terms, Lico (2012, p.19, online) defines capital budgeting as 'the process of choosing the firm's long-term capital assets'. Deriving the concept, Welch (2009, p.45) discusses capital budgeting from different theoretical perspectives from 'value, risks and returns, perfect market, and real-world application'. Again, according to Welch's (2009, p.45) position 'in a perfect market under risk neutrality, there are no taxes, no transaction costs, no disagreements, and no limits as to the number of sellers and buyers in the market'. Furthermore, Fabozzi and Pamela (2003, p.358) derives, 'capital budgeting is the process of identifying and selecting investments in long-lived assets, or assets expected to produce benefits over more than one year'. A further determination done would be with the response to cash flow and risks associated with an investment. In determining further emerging theories, that would be for consideration would come from the concept that Fabozzi and Pamela (2003, p.359) identified five stages in capital budgeting process⁹ being;

'Stage 1: Investment screening and selection,

- Stage 2: Capital budget proposal,
- Stage 3: Budgeting approval and authorization,
- Stage 4: Project tracking, and
- Stage 5: Post-completion audit.'

From a further indication of the projects' enhancement, Fabozzi and Pamela (2003, pp.360-363) again discusses 'different ways managers classify capital investment projects' as;

- i. 'Classification according to their Economic Life: This would further derive as;
 - physical deterioration,
 - obsolescence; or
 - the degree of competition in the market for a product.
- ii. Classification according to their Risk: the 'investment's risk of return' would further be determined from,
 - Replacement projects,
 - Expansion projects,
 - New products and markets, and
 - Mandated projects.
- iii. Classification according to their dependence on other projects: The further consideration would be the way projects already done would affect or would be affected by introduced projects as;
 - Independent Projects,
 - Mutually Exclusive Projects,
 - Contingent Projects, and
 - Complementary Projects.'

From the discussion ensued, in determining capital rationing models, Brealey et al. (2011, p.117) ascertained that 'linear programming models seem tailor-made for solving capital budgeting problems when resources are limited'. Therefore, in determining their usage universally, Brealey et al. (2011, p.117) further state that;

- i. 'these models can turn out to be very complex, and
- ii. with any sophisticated long-range planning tool,
- iii. these models are based on the assumption that all future investment opportunities are known,
- iv. there is the general problem of getting good data.'

There are also other determinants, and that they are costly tools, of which when used in determining data, it would be inefficient. From the perspective of investment, that would be from Modigliani and Miller's (1958) theory. In reviewing the paper of Olawale et al. (2010, p.1276), 'Modigliani and Miller (1958) argue that managers should ignore financing and dividend decisions as irrelevant and focus on positive net present value (NPV) investment opportunities that would maximize the value of the firm'. In determining the applicability of financial investment tools that would maximize the value of the firm, Olawale et al. (2010, p.1276) again had a discussion. It indicates, 'Hastie (1998) on the contrary regarded the financial theory that recommends the utilization of sophisticated techniques such as net present value to improve decision making and maximize the value of the firm as unwarranted'.

In line with this position that the Delaware courts according to Widen (2008, p.579) also 'developed a surprisingly large body of law regarding the proper analytics for valuing businesses'.

⁹ See Fabozzi and Pamela (2003, p.359), for the in-depth concept on the theory.

The experience from the appreciation of the law courts on the computation for investments and their outcome, when litigation set-up would prove scientifically beyond a reasonable doubt, all things being equal, therefore, their stand. When computing discounting cash flows certain elements would identify from the theories computed with others admitting the time value of money concept, whiles others do not agree to it. Some identified DCF models that would recognize the time value of money being the NPV and IRR, whiles the non-DCF models of PBP, ARR and PI would not admit the time value of money.

From the captured understanding according to Widen (2008, p.580), 'for more than twenty years Delaware courts have stated that proper valuation techniques include those "techniques or methods, which are generally considered acceptable in the financial community",... accept basic valuation methodologies such as discounted cash flow ("DCF") analysis as well as the capital asset pricing model ("CAPM") in selecting appropriate discount rates for use in DCFs'. This position discussed would support with footnotes as to the 'financial community' and the ("CAPM"), driving to the determination of the discount rate and the formula for computing such investment decisions. The side of the Delaware courts for computing with these models would have scientific analysis as the basis and understanding.

According to Widen (2008, p.599, footnote 88), 'Vice Chancellor Strine's criticism of Lehman Brothers in In re Topps' had challenges with the valuation projections presented. Vice Chancellor Strine, derives further that it "puts even more weight on the terminal value calculation", and its' achieved objective. The outcome of a reduction ensued from the five-year projection, according to the Counsel for Topps coming to three years. Brennan and Schwartz (1985, p.135) discusses that, 'the standard technique, which has remained unchanged in essentials since it was originally proposed (see Dean 1951; Bierman and Smidt 1960), derives from a simple adaption of Fisher (1907) model of valuation under certainty'. From the result, this technique uses rates that it considers fit taking into account the risks factor before the result established would compare the costs it generates. However, there are other models determined as modern according to Brennan and Schwartz (1985, p.136), 'analyzing natural resource investment projects, where uncertain prices are a particular concern'. In furtherance, such models are derived for 'the evaluation of investment projects ... treats output prices as Stochastic', Brennan and Schwartz (1985, p.136) Therefore, investment decision making holds that, the 'stochastic optimal control theory has been applied to the investment decision in a general context by Constantinides (1978), and in specific context of a regulated public utility by Brennan and Schwartz (1982a, 1982b)', Brennan and Schwartz (1985, p.137). This model determined had some limitations of homogeneity, the determined value or amount and costs already known with the interest rates for computation are also not stochastic determinants. It would be acknowledged from the discussions ensued, that the different theories for capital budgeting investment projects determined would clarify principles for use.

2.3.1.1 Capital Budgeting Tools – NPV and IRR

The tools of NPV and IRR are time value of money concepts that would determine the expected future cash flow benefit, maximizing the worth of the firms' owners.

2.3.1.1.1 Net Present Value - NPV

The NPV expressed, would be the difference between the total present value of future cash inflow, and that of the total present value of future cash outflow, determined, would be the present value of all expected cash flow. The determined would be by the formula for even cash flows as;

 $NPV = CF \ge \frac{1 - (1 + i)^{-n}}{i} - IO$ where, CF = Cash inflow IO = Initial cash investment i = required rate of return /or, cost of capital ^ / n = number of periods

The NPV has various advantages and disadvantages, and their handling would define value. The main NPV advantage would be that;

- a. It regards the time value of money,
- b. It regards the risk of future cash flow,
- c. It regards maximizing owners' wealth.

The NPV disadvantage of;

a. Difficulty in the cost of capital calculating and determining,

The decision rule criteria would be that, the NPV > 0 would be an accepted project, NPV < 0 would be a rejected project, aligning to the advantage of, maximizing owners' wealth.

2.3.1.1.2 Internal Rate of Return - IRR

The IRR, 'is the discount rate that causes the project's NPV to equal to zero', Fabozzi and Peterson (2003, p.423). Petty et al. (2006, p.308) also develop as, 'the discount rate that equates the present value of the project's future net cash flows with the project's initial cash outlay.' It would be according to Paramasivan and Subramanian (2009, p.131)¹⁰ as;

 $IRR = Base factor + \frac{Positive net present value}{Difference in positive and} x DP$ Negative net present value

where, Base factor = Positive discount rate; DP = Difference in percentage

The pointer would form the firm, earning its investment from the rate of return. These determine the advantage of the IRR as;

• Considering the time value of money

The disadvantage would be;

- That, it does not consider projects with uneven investment magnitude.
- That, computation on re-investment would obtain wrongful project selection.

The decision criteria would state, when IRR > cost of capital, would accept the project, and IRR < 0, would reject the project, aligning to the firm retaining its cost of capital, and wealth of the firm owners.

2.3.1.2 Capital Budgeting Tools – Emerging Concept NT &

In developing the emerging concept, it would be ascertained, the subjective risks factors would determine uncertainty that, the numerical analysis achieved, would be the definite markup determinant crucial for the unforeseen outcome of expected future cash flow. Hofstede (1998) determines the cultural dimension of individualism, power distance, uncertainty avoidance, and masculinity. The underlying concept crafted would form the consideration of uncertainty from total risks stand-points. Therefore, the concept would derive from the acronym of 'PESTLE' (Political, Economic, Socio-Religious-Cultural, Technical/Technological, Legal and Environmental) in crafting the emerging concept of uncertainty to certainty mathematically determined. The Emerging concept accepts the rule that uncertainties are undetermined. From this pointer, calculating determinate from the future would be the wicked problem. Therefore, determining the tamed problem, the NPV decision rule would serve the rule. The calculation format would determine from functional formula as:

 $c = ((1 + r)^{n_1} - IO((1 + r)^{n_1})$ where, IO = initial investment,

r = interest rate (cost of capital) n = number of period CF = cash flow

The further analysis determined with the Microsoft Excel would be from;

	Using Excel functions
cash inflow (initial inflow) [CF]	
discounting valuation – [dv]	=NPV(r, CF) \wedge 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]	

Table 3-2.3.1.2 Capital Budgeting Tooling - Emerging concept

The advantages of the concept would be;

i. It regards the time value of money,

¹⁰ See Paramasivan and Subramanian (2009, pp.131-132), for the merits and demerits determined, criteria for accept/reject of the project and the interpretation of the developed formula.

- ii. It establishes mathematically markup for uncertainties difficult to identify as an effect on the required expected future cash flow,
- iii. It regards the expected future cash flow,
- iv. It considers subjective and behavioural tendencies emanating from the acronym, 'PESTLE' from mathematical determining,
- v. It regards the business-mindedness derived as maximization of owners' wealth.

The main disadvantage would be that;

i. It determines an insignificant uncertainty, becoming significantly determined.

2.4 Historical Thinking of Capital Budgeting

The historical thinking on capital budgeting would emanate from the period undetermined through the ages to the present times of the 21st century as models developed would ensue. The models developed through to the present times would ascertain from the non-DCF, DCF and other supplementary or sophisticated financial tools. The sophisticated financial tools would be decision tree, sensitivity, simulation and scenario analysis according to the study from Haka (2007, pp.717-719). Also, Haka (2007, p.704) had the 'diffusion of discounting procedures', and it would affirm that Haka (2007, pp.705-707) further supported with the 'DCF Usage Survey'. This survey had the techniques used from 1959 to 2002. Through the periods, studies on capital budgeting often reflect on the DCF technique as a whole, of which the ending era of the 19th century had the technique separating into the NPV and the other tools. From the usage study derived by Haka (2007, pp.705-707), shows from 1959 through to 2002, the pattern the techniques had for investment decisions. In furtherance, from the study on DCF according to Segelod et al. (2011, p.166), 'Fish (1915)... published the first textbook on the subject. The tool existed, but its use was highly sporadic'. Also, Segelod et al. (2011, p.166), again discusses that 'Wellington (1887) is the known person in the railway industry that did the introduction of the 'DCF technique for their design and evaluation'.

However, the era before the 14th century had other mathematical tools for financial decisions into money management and business decisions. Concerning the calculation for the lifespan of humans, the actuaries used certain probabilities in determining their outcome. The times would have the various appreciations of the techniques as would ensue from problems encountered from the World War I in the industry. The outcome, Segelod et al. (2011, p.167) put forward, 'firstly, businesses had to appraise the expected return on investment (ROI) and request funding ex-ante, and secondly, businesses were evaluated on their ROI ex post'. These ascertained resulted in the industry with Henry du Pont's company seen not to be using the DCF until the 1960s. As time evolves, Segelod et al. (2011, p.166) reiterate that 'it took some 400 years before DCF techniques were applied to capital investments'. Meanwhile from the prior years, engineers, actuaries and accountants had the appreciation of the use of other mathematical techniques through to the DCF.

In thinking through the times for capital budgeting, risk and uncertainty cannot be ignored. It would show that this has been the reality as to the developments realized from projects in the building of the pyramids in Egypt and monumental edifices of Great Babylonia and others. Covello and Mumpower (1999, p.33), 'reviews the history of risk analysis and risk management giving special emphasis to the neglected period to the 20th century'. It would ascertain that the Asipu of ancient Babylonia about 3200 BC, that lived in the 'Tigris-Euphrates valley' were diviners on risk. Until the times past, a risk was quantitatively determined with 'mathematical probabilities and confidence intervals' informed by Segelod et al. (2011, p.34). From modern perspectives unlike the era of the Asipu and through the Christianity period, where certainty determined was through mathematical computation, but not through divination. In furtherance, Bernstein (1995, p.1) indicates that 'the entire Mediterranean basin from 500 BC to 300 BC was a hotbed of scientific research'. Therefore, the knowledge of theories from Geometry and Pythagorean Theorem emits from Egypt and the Greeks. These form the basis of the theories for investment decisions through the era to present 21st-century investment appraisal techniques for project decisions. In acknowledging the concept through time, risk emits in capital budgeting techniques when financial decisions would ensue. Also, Haka's (2007, pp.700-703), 'table 1, Diffusion history for investment appraisal methods' as referenced, to 'a similar table in the appendix of Callahan & Haka (2004)'. The table would give the ideals and concepts through the times to the present era on the various dimensions for the study.

3.0 RESEARCH METHODOLOGY

Research would be derived from a conceptual to an analytical theory as has been determined by Rajasekar et al. (2013, p.2) as, 'a logical and systematic search for new and useful information on a particular topic. In the well-

Published by: Dama Academic Scholarly & Scientific Research Society (www.damaacademia.com) known nursery rhyme, Twinkle, Twinkle, Little Star! How I Wonder What You Are. The use of the words 'how' and 'what' essentially summarizes what research is. It is an investigation of finding solutions to scientific and social problems through objective and systematic analysis.' The prime objectives of research¹¹ according to Rajasekar et al. (2013, pp.2-3) is 'to discover new facts, verify and test important facts, analyze an event or process' and others. These prime objectives would be the driving forces that would need a research methodology to address them scientifically for 'systematic analysis' Rajasekar et al. (2013, p.2). Therefore, research methodology according to Rajasekar et al. (2013, p.5), 'is a systematic way to solve a problem. It is a science of studying how research is to be carried out.' Also, an almost closer derivation is given by Kothari (2004, p.8) as, 'a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically.' From this understanding of scientific research, mathematical computations would not be the only consideration for the study but as Rajasekar et al. (2013, p.5) indicated that there is the need to know; which is a suitable method for the chosen problem?, what is the order of accuracy of the result of a method?, and what is the efficiency of the method?' In consideration to these that the aims, research design, ethical considerations and the research methods would derive the new knowledge from the problem statements on the sector.

3.1 Aims

The essential aims of the study would be the study's objectives comprising of: The primary and secondary methods would be for gathering the study's data for investigative analysis. These would form the foundation for collecting data for the study with the one-on-one interviews for primary, and books, periodicals, organizational reports, the intranet, and the internet as secondary sources. Using the mixed research methods of qualitative and quantitative for generating quantitative results. These would be the methods designed for the study's data analysis. These data counted would be the information to create values for analysis. Also, percentages would be rounded to two decimal places for error reduction and accuracy in determination. Would use a fitting sampling method that would give a fair illustration from the sample size computation for the requisite scientific result, and for achieving the hypothesis. The study would make sure that requisite ethical consideration as accepted by the University would be in place for scoring an academic competence. The espoused aims would be the underlying foundation of the study.

3.2 Research Design

The research design defined would be by Singh (2006, p.77) as, 'a mapping strategy. It is essentially a statement of the object of the inquiry and the strategies for collecting the evidences, analyzing the evidences and reporting the findings.' Singh (2006, p.77) further indicates that the research design has these components;

- a. 'Research method or research strategy,
- b. Sampling design,
- c. Choice of research tools, and
- d. Choice of statistical techniques'.

These components when reviewing the work of Blaxter et al. (2006, p.63), have been defined by the 'research families, approaches and techniques'¹² projected in a tabular format. Therefore, from these appreciations, the study would input qualitative and quantitative methods as the mixed methods for the mathematical analysis. The mathematical analysis would be on data gathered from primary and secondary sources from the fieldwork, through survey questionnaires, interviews and observations done. The survey taken would be from a computed sample size deemed to represent quite a large number of respondents. The sample size would be from the proportionate stratified random sampling calculation devoid of errors, and with a high precision rate, at the confidence level of 95%. Furthermore, there would be the statistical tools for computing of the chi-square mathematical format for deriving the hypothesis. The study would assess the computation of correlation of the relationship, between variables of educational background to the usage of capital projects model adopted by the sector. In a nutshell, Singh (2006, p.77) drives that, 'it essentially includes objectives, sampling, research strategy, tools and techniques for collecting the evidences, analyzing the data and reporting the findings'. Therefore, these facts would facilitate the processes of the study.

3.3 Ethical Considerations

- The two identified ethical issues in research according to Walliman (2011, p.43), are;
- i. 'The individual values of the researcher relating to honesty and frankness and personal integrity, and

¹¹ See Rajasekar et al. (2013, pp.2-3), What are the Objectives of Research? With 6 identified principles of note.

¹² See Blaxter et al. (2006, p.63), Box 3.3, Research families, Research approaches and Research techniques inline to this theory derived.

ii. The researcher's treatment of other people involved in the research, relating to informed consent, confidentiality, anonymity and courtesy.'

These ethical issues analyzed would be with Smith's (2003, pp.56-62) five principles¹³ for research ethics. It would show that the onus to a larger extent would be on the researcher's values individually, and for respondents' coming out with a property duly taken through the rightful process. The study would conform to these modalities set out for achieving the requisite data for the quantitative analysis. The survey questionnaires, interview questions, and the methods for gathering the data would conform to 'honesty, frankness and personal integrity' determined by Walliman (2011, p.43). From the background study and interviews to be done, the study would not take personal data of respondents for committing the respondent. Likewise, as Walliman (2011, p.43) derives, 'confidentiality, anonymity and courtesy' would be given the highest priority same, and the articles and studies of others used for the study would acknowledge according to the University's system of Harvard Referencing. Again, the Letter from the University¹⁴ consenting to the study and usage of the data collected for academic study would develop as the prime. From these considerations, ethics would be an essential obligation for the study.

3.4 Research Methods

According to Walliman (2011, p.7), 'research methods are the techniques you use to do research. They represent the tools of the trade, and provide you with ways to collect, sort, and analyze information so that you can come to some conclusions'. The drive to achieve 'validity' Walliman (2011, p.7) would be prime, from the conclusions, gathered for the study. Therefore, the study would derive its techniques from credible samples, results, questionnaires and interviews for achieving 'the new knowledge' as derived by Walliman (2011, p.7).

3.4.1 Samples

From the works on the definitions for sampling, Sharma (2008, p.112) indicates, 'W. G. Cocharn: "In every branch of science we lack the resources, to study more than a fragment of the phenomena that might advance our knowledge".' The study would describe 'fragment' as 'sample', and 'phenomena' as 'population'. Furthermore, according to Sharma (2008, p.112), 'David S. Fox: "In the social sciences, it is not possible to collect data from every respondent relevant to our data from every fractional part of the respondents. The process of selecting the fractional part is called sampling".' Therefore, the essential thing would be deriving a sampling frame with the intention of a population size of 300 from the sector. The probability sample of stratification¹⁵ would be used to compute valid results. This stratified sampling method type would be the proportionate stratified random sampling. This theory has its advantages and weaknesses, but to a larger extent, the study would achieve its results from the method concerning its statistical precision rated high, at the confidence level of 95%. From the computation of the population size with a factor of fraction using the strata, the intention would be to minimize sampling error, reduce the time and cost in achieving a valid result. In determining the sample size, it would be acknowledged from stattrek (2015, online) that, the 'sample fraction is equal to the sample size divided by the population size, n/N,'

where, n = sample

N = population size,

Therefore, in computing the sample size mathematically, the formulae would be inversely derived as;

n = N/2

where, $\frac{1}{2}$ is denoted as sampling fraction being S_f therefore, the sample size computing would be; S_f = $\frac{n}{N}$

The sample size from the population size would be determined as follows, Explorable.com (2009, online);

Table 5-3.4.1	Determining the Sample Size	
Strata	The Sector	

¹³ See Smith's (2003, pp.56-62), Five Principles for Research Ethics being;

iii. Follow informed-consent rules, iv. Respect confidentiality and privacy,

- 1. Ensure an adequate same size, and
- 2. Improve the precision of the results.

i. Discuss the intellectual property frankly, ii. Be conscious of multiple roles,

v. Tap into ethic resources.

 ¹⁴ See: Appendix 3: Ethical Approval, Letter of Consent from the University, signed: Prof. Allan Kwesi Asante-Yeboah, copied: Prof. Dr. George C. Reiff, dated: 20-10-2014

¹⁵ See SAS OnlineDoc (1999, p.153), The reasons for stratification would be,

Population Size = N	300
Sampling Fraction = S_f	1/2
Sample Size Computed = n	150

In deriving the ideal sample that would be for the study scientifically from the theory identified, Sharma (2008, pp.114-115) further points out as;

- i. Representativeness,
- ii. Independence,
- iii. Adequacy,
- iv. Homogeneity.

These identified theories would form the basis of the scientific results of the study.

3.4.2 Results

The results would emanate from the survey questionnaires, and interviews gathered from the sample size of 150 population. From previous studies on the sector and observations gathered, the study would ascertain from the stratified sample that 114 population would respond. The result would represent a response rate of 76% that would describe as 100% for the study. The study would compute the hypothesis with the chi-square statistic formulae for concluding the 'validity' Walliman (2011, p.7) of the study. The computation would prove as follows;

Chi-square statistic test, $x^2 =$

	-
Σ (observed – expected	$)^{2}$
avpacted	
expected	

The computation would come from Ryan's (2014, online) format as the 'General notation for a 2 x 2 contingency table', as follows;

Table 6-3.4.2	2 x 2 contingency table computation
---------------	-------------------------------------

variable	outcome i	outcome ii	totals
question i	Sw C	X	w + x
question ii	y y	z	y + z
totals	w + y	$\mathbf{x} + \mathbf{z}$	w + x + y + z

Therefore, fixing the derived values into the formulae would be; Table 7-3.4.2 2×2 contingency table chi-square statistics

1 abic 7-3.4.2	2 x 2 contingency table cin-square statistics
$x^2 = (wz - xy)^2 (wz - xy)^2$	w + x + y + z)
(w + 2	x)(y+z)(x+z)(w+y)

It would have to be noted that, the 'four components of the denominator are the four totals from the table columns and rows' derived by Ryan (2014, online). The results from the chi-square derived would be used for the hypothesis test. However, the distribution table from Foltz (2014, online, video) on 'Hypothesis Testing: Introduction to Chi-Square' would be used. The steps would be as follows;

- i. The hypothesis derived would be the H_0 and the H_1
- ii. The test statistic derived would be from the chi-square critical value, computed with Excel 2007 from the formulae;
 - =CHIINV(error, df)
 - where, error would be the probability given as p-value ≤ 0.05 (from confidence level computation, thus, 100% 95% = 5% or 0.05 alpha α). The (df) would be the degree of freedom given as, '(number of columns minus one) x (number of rows minus one) not counting the totals for rows or columns', Ryan (2014, online). Therefore, the data would give (2-1) x (2-1) = (1) x (1) = 1
 - More so, chi-square critical value would be, =CHIINV(0.05, 1) = 3.84
 - The chi-square critical value would then be compared with the chi-square x^2 value to establish the higher value and decide for the hypothesis.
- iii. The decision for the hypothesis would be made, where p-value ≤ 0.05 , and the chi-square x² value being higher than the chi-square critical value, at 95% confidence level, the H₀ would be rejected, and H₁ accepted.

Therefore, it would interpret that, the variation would be too great to be explained by chance alone.

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Change of P-value: In setting the strictness of the study, the confidence level raised would be 99%, where computing the results of the study would change the decision rule, derive from the discussion. The error probability given as p-value ≤ 0.01 (derive from confidence level computation, thus, 100% - 99% = 1% or 0.01 alpha α), the (df) degree of freedom would be derive same from our data as, $(2-1) \times (2-1) = (1) \times (1) = 1$. Therefore, the chi-square critical value would be, =CHIINV(0.01, 1) = 6.63. Invariably, the p-value ≤ 0.01 would give the chi-square critical value as 6.63, from the 99% confidence level, whiles the p-value ≤ 0.05 would be 3.84. Therefore, the 95% confidence level would be compared to the chi-square value for the decision rule on the hypothesis been determined. Therefore, the p-value would be highly significant as an association between the derived variables, and random variation would not result from the outcome, but actual emphasize would ensue from the observed data.

- Some reasons for using chi-square, according to Foltz (2014, online, video) is that;
 - i. It helps us compare what we observed with what we expected,
 - ii. It assists us in rejecting random chance variations between two categorical variables, and
 - iii. The distribution is used to accept or reject our hypothesis regarding random chance.

In aligning to the results of the survey questionnaires and interviews gathered, the computation and pictorial presentation would be from;

- Section A on the Demographic Data of Respondents with Three (3) questions on Educational Background, Length of Service and Age for determining the correlation.
- The Sections B and C with Five (5) questions each would derive the results from the problem statements and hypothesis from the chi-square formula and percentages computing.

The data gathered from these questionnaires would be manually done for statistical calculation. Also, frequency tables would be ascertained, and data calculated with percentages derived would round them to two decimal places for easy analysis. The results discovered would be devoid of calculation errors, and factual differences would not be concealed. The results to a larger extent would determine the study's conclusion and recommendations.

3.4.3 Questionnaires

In deriving the survey questionnaires, the basis of computing the results quantitatively would be prime. Therefore, 'closed' and 'sliding' questions as Stuart and Nicola (1986, p.15) discusses would be the focus. Also, qualitative data would be processed into quantitative data for analysis. From Dawson (2002, p.88), some advantages gathered using closed questions are: 'Tend to be quicker to administer, often easier and quicker for the researcher to record responses, tend to be easy to code, and is quick and easy for respondents to tick boxes – might be more likely to answer all the questions.'¹⁶ From these discussions, Walonick (2010, p.245) points out that, 'grouping questions that are similar will make the questionnaires easier to complete, and the respondent will feel more comfortable'. Therefore, the survey questionnaires would be less of jargons for clear understanding and easy for completion. Upon these bases that 14 survey questionnaires would be derived as follows;

- Section A: Demographic Data of Respondents of 4 questions,
- Section B: Existence and Importance of Risks Evaluation Systems in Capital Projects of 5 questions, and
- Section C: Existence and Relevance of Capital Appraisal Systems in Capital Projects of 5 questions.

These crafted survey questionnaires would compute the numeracy for the quantitative analysis of the study. A considered survey questionnaire that would be for the study has been provided as Appendix I.

3.4.4 Interviews

The study would use semi-structured and structured interviews for quantitative results that would generate from a five (5) point question pattern. These questions would be on models for capital budgeting and project management, with risks associated with capital projects, and the survey questionnaires would serve as a guide and support. The 5 point questions derived would be the;

- a. Existence and Importance of Risks Evaluation Systems in Capital Projects
- b. Existence of Capital Appraisal Systems in Capital Projects

In deriving the interview structure, personal interview method according to Kothari (2004, pp.97-99), would form as part of the basis for its advantages of which some few factors acknowledged with weaknesses being;

- 'Advantages:
 - More information and that too in greater depth can be obtained,

¹⁶ See Dawson (2002, p.88), for the advantages of closed questions reviewing the concept applied.

- Interviewer by his own skill can overcome the resistance, if any, of the respondents; the interview method can be made to yield an almost perfect sample of the general population, and
- There is greater flexibility under this method as the opportunity to restructure questions is always there, specifically in case of unstructured interviews.
- Weaknesses:
 - It is a very expensive method, specially when large and widely spread geographical sample is taken'.¹⁷

The 5 point question assigned with the survey questionnaires would be the structure. However, the field work since it would be more of a conversation would call for certain critical questions that would ensue, when questions are being asked for answers that would assist in deriving a recommended outcome. It would be therefore an understood phenomenon that, the answers apparent, they would demand more questions to ascertain the result. Therefore, the interview questions to an extent would be derived in-line with this phenomenon.

Furthermore, the ethical considerations ascertained from the study would be a guiding principle for the personal interviews and observation on the sector. From the determining methods for the interview in consideration to the ethical policies that would be in place, the recording facility would be done in agreement with the respondents. In a situation where, there would be difficulties in recording the conversation, the answering would be written down for confirmation from the Respondent for future reference purposes.

4.0 DATA ANALYSIS

The data gathered with structured, and semi- structured survey questionnaires, interviews and observations for the study would be analyzed with statistical computations as derived.

4.1 Data and Information Description

The survey questionnaires would derive from the three (3) sections as;

Section A on Demographic Data of Respondents', would determine the relationship between educational level, age, length of service and role at work with the appraisal systems invoked for capital projects decisions. More so, tables and figures of the column, clustered cylinder from Excel 2007 would be used for the graphical interpretation. Also, Section B on Existence and Importance of Risks Evaluation Systems in Capital Projects would determine risks from its consequence, importance and evaluation with computed tables and figures same. The Section C, Existence and Relevance of Capital Appraisal Systems in Capital Projects, would determine projects management models and capital budgeting techniques used for capital projects decisions. The derived figures would also be from the column, cone charts in Excel 2007 for interpretation of the responses. It would be from these responses that the study would test the hypothesis. The interviews done would facilitate in gathering requisite understanding for interpreting the results. The gathered data both qualitative and quantitative would be counted manually for a quantitative output, and that would give two decimal places for deriving mathematical percentages. The mathematical results would be of lesser errors in deriving values not with facts concealed. Therefore, the derived data would be the values for the test statistics computation.

4.1.1 Benchmark with Emerging Concept – NPV and IRR

The stratified case study data ascertained would come from the Ministry of Power's, Electricity Company's 2011 Approved Budget determined. The receipts developed would be from the External Cash Receipts (Funding) of GOG (Government of Ghana), and the expenditure, Capital Expenditure of Regional Development Projects. The calculation would further determine to the Regional Development Project level, where the projects classified as Major and Minor Development Jobs would ensue. Therefore, the study would develop from the Regional Job of the Ashanti West/Region for determining the NPV and IRR as the benchmark, and would show the impact of the Gantt chart. The underlying consideration would be the profitability drive from the Regional output. The assumptions would be determined from the year 2009 Financial Statement notes on pages 27 to 28, as would be shown in Appendix 5.

- IDA 2682-1-GH, would develop as sector has number of years of (17 years) for payment of the GOG fund at a required interest rate of (8%).
- The year 2011 Budget assumptions used the interest rate of 10%.

The extracted figures would be as follows;

¹⁷ See Kothari (2004, pp.97-99), for the full list of the Advantages and Weaknesses identified under the Personal Interview method for the study's review.

Published by: Dama Academic Scholarly & Scientific Research Society (www.damaacademia.com) Table 8-4.1.1 Extracts from 2011 Budgeted Annual Cash Flow - National, (Appendix 5)

	Amount (GH¢)
External Cash Receipts	
(Funding):	
GOG	52,193,745.89
Capital Expenditure:	
Regional Development Projects	41,159,884.60
interest rate (r)	10%
number of years (n)	17

Table 9-4.1.1Extracts from 2011 Budgeted Annual Cash Flow - Regional (Ashanti
West/Region), (Appendix 5)

	Amount (GH¢)
External Cash Receipts	
(Funding):	
GOG (portion)	289,959.10
Capital Expenditure:	
Ashanti West/Region - Minor	228,661.17
Development Jobs	

The Emerging concept as the benchmark derived would be with the Capital Budgeting tools of NPV and IRR. The derived calculation would be determined from the Microsoft Excel, as the cash outflow amount has the mark-up, considering of risks and uncertainties of the sector stratified. The computation derived would be;

 Table 10-4.1.1
 Determining Emerging concept from 2011

 Budgeted Annual Cash Flow Extracts
 National

Budgeted Alinuar Cash Flow Extracts - National			
cash inflow (initial inflow)	52,193,745.89		
discounting valuation	47,448,859.90		
add: cash outflow (initial investment)	- 41,159,889.66		
NPV	<u>6,288,970.24</u>		
IRR	-13%		

Table 11-4.1.1Determining Emerging concept from 2011Budgeted Annual Cash Flow Extracts – Regional (AshantiWest/Region)

cash inflow (initial inflow)	289,959.10
discounting valuation	263,599.18
add: cash outflow (initial investment)	- 228,666.22
NPV	34,932.96
IRR	-13%

The decision rule would show NPV as the value greater than zero, but the IRR a negative value would indicate that the result is far lesser than the rate of return. However, the mark-up rule would ascertain from the cash outflow (initial investment), of which would satisfy the concept. The test hypothesis results would favour the outcome developed, as an indicator of profitability.

4.1.2 Impact from Gantt chart

The Gantt chart as used would be for the stratified sectors' case project scheduling. The study would identify that, when projects are given to third party contracts to handle, allotting of project scheduling computed would need controls. The controlling and planning of projects would assume from project constraints of time, cost and quality, from a risk and uncertainty environment that would need managing for a valuable outcome. From the outcome, the study's case study stratified projects for the sector on Minor Development Jobs for Ashanti West/Region of the ECG would develop the scheduling table from the interview. The interview with Project Engineers would set the activity as follows;

Table 12-4.1.2	Project Activity for Gantt scheduling	
Activity	Activity Description	Duration (weeks)
А	Installation of Pole works	4
В	Stranding of conductors	3
С	Installation of overhead types of equipment	5
D	Burying of cable works	4
E	Installation and testing of Transformer(s)	2
F	Inspection and Job completion certificate for	1
	payment	
	total	19

The cost element would be ascribed from the Emerging concept of GH¢228,666.22. Therefore, any delay in the set time elements would increase the cost of the project as determined by the Emerging concept. Invariably, the labour cost a fixed amount used would not change, however, the project material component prices rather would change, giving a variance to the estimated. The underlying concept would be that, projects delaying beyond the settiming would fall into the uncertainty area in the constraint environment, thereby would increase the cost of the project. However, due to the Inspection factor of the project ensuing, quality to the standard of the project would follow satisfying outcome for the payment of the labour charge, which would be the interest of the third part contract. The Gantt chart from the table would be;

Table 13-4.1.2	Impact of	Gantt chart	on	determined	proj	ect
					r - ~J	

	Weeks ENT 8						
Activity Description	1-3	4-6	7-9	10-12	13-15	16-18	19-21
Installation of Pole works	r.			2			
Stranding of conductors	× h			T			
Installation of overhead types of		\mathbf{X}	×5				
equipment						L	
Burying of cable works				ă			
Installation and testing of	E			2			
Transformer(s)	8			8			
Inspection and Job completion							
certificate for payment							

The chart would show for planning and control served as the model that impact from project management for the sector stratified in reducing complexity. Invariably, the scheduling would align with the capital budgeting tools of NPV and IRR to determine the health of projects' starting and ending.

4.2 Context Of Research Sites

The Letter of Consent from the University would be sent, to organizations in the sector, and the HR department would be the first point of contact. The planned schedule of data gathering would fall within a period of one week. However, there would be anticipated limiting factors for the collection of the survey questionnaires and interviews from, Unplanned meetings of the Managers, and Reluctance on the part of respondents' addressing the survey questionnaires. From other studies on the sector and the gathered limiting factors, the planned population sample size of 150 would achieve 114 population responses rate of 67%. Therefore, the results ascertained would constitute 100% total responses for the study's statistical analyses. Also, interviews scheduled would be for a planned population size of 30, but 14population responses rate of 47% would constitute 100% total responses for the analyses of the study, from the same analogy. The responses derived would be from the Responses Achieved tables 1 and 2, for the survey questionnaires and interviews and further interpreted graphically with the column, clustered pyramid in Excel 2007, Figures 1 and 2.

RespondentsResponsesPercentage (%)						
Managers	21	18.42				
Supervisors	66	57.90				
Direct Reports	27	23.68				
n=	114	100				

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Figure 1 Analysis of Response Achieved – Survey questionnaires . . .

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Table 2 Response Achieved – Interviews					
Respondents	Responses	Percentage (%)			
Managers	2 0/2	14.29			
Supervisors	7	50.00			
Direct Reports	5	35.71			
n=5	14	2 100			



Figure 2 Analysis of Response Achieved – Interviews

4.3 Analysis of the Questionnaires

The survey questionnaires determined would be statistically from the achieved responses from the proportionate stratified random sampling technique. The determined results statistically from the data would be derived.

4.3.1 Analysis of Demographic Data of Respondents

The responses would be from the Educational Level determined visually from their roles as follows;

Table 3 Educational Level of Respondents

Response	ndents' Percentage (%)	Bachelors' Degree	Masters' Degree	Doctorate Degree	Professiona 1 / Chartered	Other Certificate s	Total
	Frequency	6	5	2	8	-	21
Managers	Percentage (%)	5.26	4.39	1.75	7.02	-	18.42
	Frequency	31	17	0	6	12	66
Supervisors	Percentage (%)	27.19	14.91	-	5.26	10.53	57.89
	Frequency	8	-	-	-	19	27
Direct Reports	Percentage (%)	7.02	-	-	-	16.67	23.68



Figure 3 Analysis of Educational Level of Respondents

The results of the demography of Managers and Supervisors with Masters' Degree of 4.39% and 14.91% respectively would determine their drive for appraisal systems in capital projects decisions. Also, their Professional/Chartered certification would highly contribute to their appreciation of evaluation systems when risks have higher concerns in capital projects. The other decision rules analyzed with their percentages and frequency values from the table and graph would confirm suggestions given.

4.3.2 Existence and Importance of Risks Evaluation systems in Capital Projects.

The analysis results of 32.46% and 12.28% from the Supervisors and Managers respectively would show the decisions ascertained in the sector. The frequency and pictorial presentation provided would inform the cash outflow decisions the sector would encounter on capital projects.

- mportance or	importance of considering risks and uncertainties in capital projects decisions							
Responde	Respondents' per activity		Agree	No idea	Disagree	Total		
		agree						
Managers	Frequency	14	7	0	0	21		
	Percentage (%)	12.28	6.14	0	0	18.42		
Supervisors	Frequency	37	23	0	6	66		
	Percentage (%)	32.46	20.18	0	5.26	57.89		
Direct	Frequency							
Reports		8	12	4	3	27		
	Percentage (%)							
		7.02	10.53	3.51	2.63	23.68		

 Table 4 Importance of considering risks and uncertainties in capital projects decisions

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> Percentage (%) 28.07

> > 50.88

21.05

Figure 4 Analysis of Importance for considering risks and uncertainties in capital projects decisions

The study evaluates on-going capital projects for unforeseen circumstances, which would affect the projects' timelines in completion. The outcome that would ensue for the on-going capital projects evaluation had a No rating with the highest score of 50.88%.

Table 5 Risks Evaluation of on-going capital projects.

Frequency

32

58

24

The result would suggest that there would not be any activity, and presented pictorially same.

Activity

Yes

No

Non



Figure 5 Analysis of Risks Evaluation of on-going capital projects.

4.3.3 Existence and Relevance of Capital Appraisal Systems in Capital Projects.

The existence and relevance of the capital appraisal systems would facilitate in ascertaining the requisite answers for the test statistics at the confidence level of 95%. The test derived would show the p-value ≤ 0.05 , all things being equal, and for frequency only would be calculated.

For confidentiality purposes, the Managers, Supervisors and Direct Reports would be coded as AO1, AO2 and AO3 for the observed results. The derived data would show the sector has its appraisal system of 63-frequency of which would be derived further as representing 55.26%;

11			1 1	9
Descriptors (Frequency)	A01	AO2	AO3	Total
Own system	25	31	7	63
Recognized Financial				
method	29	12	8	49
Non	0	0	2	2
Total	54	43	17	114

Table 6 Financial Appraisal method in capital projects.

4.3.3.1 Hypothesis Test

From the Table 6, the study would derive the computation test from the results with the chi-square statistics tests, established by Foltz (2014, online, video). The computation would further develop with Ryan's (2014, online) input as performed in determining the results as the outcome. The table 6 would be further derived as follows, with table 6.1 as the observed for the test, the rest of the statistical computation would derive.

Table 6.1 Observed						
Descriptors	AO1	AO2	AO3	Total		
(Frequency)						
Own system	25	31	7	63		
Recognized						
Financial method	29	12	8	49		
Non	0	0	2	2		
Total	54	43	17	114		

The expectancy frequency would follow by deriving from the table 6.1 as;

Own system	25	31	1	63
Recognized				
Financial method	29	12	8	49
Non	0	0	2	2
Total	54	43	17	114

Table 6.1.1 Deriv	ing Expectancy	Frequency
-------------------	----------------	-----------

63 x 54	<u>.</u> = 29.84,
114	
	ENTE

Table 6.2 Expectancy

Descriptors	A01	AO2	AO3	Total
(Frequency)			F	
Own system	29.84	23.76	9.39	63
Recognized	X		٥٢	
Financial			Ŭ	
method	23.21	18.48	7.31	49
Non 🔪 🗠	0.95	0.75	0.30	2
Total	54	43	17	114

Then followed by the computation from the chi-square formula for the resultant; Table 6.3 Deriving the study's chi-square, x^2

Observed	Expectant			
(0)	(E)	(O - E)	(O - E)^2	(O - E)^2/E
25.00	29.84	(4.84)	23.43	0.79
31.00	23.76	7.24	52.42	2.21
7.00	9.39	(2.39)	5.71	0.61
29.00	23.21	5.79	33.52	1.44
12.00	18.48	(6.48)	41.99	2.27
8.00	7.31	0.69	0.48	0.07
0	0.95	(0.95)	0.90	0.95
0	0.75	(0.75)	0.56	0.75
2.00	0.30	1.70	2.89	9.63
			Total = X^2	18.72

The degree of freedom (df) computed would be from the table as; $(3 - 1)(3 - 1) = (2 \times 2) = 4$. However, the chi-square critical value would be derived as, =CHIINV(0.05,4), with the result of 9.49. Furthermore, the p-value would be \leq 0.05 at the confidence level of 95% significant. In drawing the decision, p-value ≤ 0.05 signifying a 95% confidence level of x^2 of 18.72, critical x^2 of 9.49, the study would reject H₀ and accept H₁.

4.3.3.2 Test of Strictness

The study would test the strictness from Foltz's (2014, online, video) input. The value and variation for the study would ascertain from the 99% confidence level as computed of (error probability) p-value ≤ 0.01 ,

- (df) = 4
- $x^2 = 18.72$
- critical $x^2 = 13.28$
- Therefore, the decision rule at 99% significant confidence level would come forth from analyzing the concept. The study would, therefore, reject H₀ and accept H₁, since the variation would still hold significantly. Therefore, it would mean that, the 'variation was too great to be explained by chance alone' Foltz's (2014, online, video).

4.4 Conclusions from Questionnaires

The survey questionnaires statistically tested would draw the conclusion that the sector has models they own. In ascertaining the importance of risks from the roles as Managers, Supervisors and Direct Reports, the study discovered that their relevance would be prime. However, when assessing on-going projects from risk evaluation, the study would conclude that it is not done. The data would conclude with the alternative hypothesis accepted as, 'the sector have capital budgeting tools that serve as a benchmark with impact from project management models'.

4.5 Analysis of the Interviews

The interviews that would be done would be analyzed with the essential graphical figures and statistical tables to derive the frequency, and with percentages. From the existence of capital appraisal systems for capital projects, the sectors' methods of calculating for projects would be identified. The identified projects would come from maintenance, rehabilitation and reconstruction of roads from the feeder roads, urban roads and highways, providing for electricity and construction of buildings. These capital projects would be mostly outsourced to mitigate against unforeseen circumstances, therefore, the lesser appraisal of these projects, but there would be systems for estimating for their funding. Also, the existence and importance of risks evaluation systems for capital projects would demand answers. In ascertaining the answer, would be that the sector does not have the required manpower for working on major projects, therefore, outsourcing would be the decision. However, projects done and inspected would show such indices of risks for assessment. The outcome from some identifies unforeseen events would be;

- Legal issues,
- Labour unrest,
- Environmental issues from unreliable weather pattern of rainfall, and
- Delays of governments' funding.

These and other issues identified would form the basis for the study's analysis. The answering for the rating of unforeseen events in the organizations' capital projects decisions analyzed would be with the requisite tools. From the obtained analysis, the study would show, Relevant and Highly Relevant of 35.71% and 28.57% respectively, would draw the conclusions for the sectors' appreciation on the importance of risks evaluation. The results would indicate an achieved degree of relevance.

Ratings	Frequency	Percentage (%)
Not Relevant	0	0
Relevant	5	35.71
Indecision	2	14.29
Not Highly Relevant	3	21.43
Highly Relevant	4	28.57
	14	100.00

Table	7 Rating	of Unforeseen	Events in (Capital Pro	iects Decisions.
Lanc	/ Itating	or onnoncocci	L'ULU III V	\mathcal{L}_{apriar}	CCUS DCCISIONS.



Figure 7 Analysis of Rating of Unforeseen Events in Capital Projects Decisions.

From the gathered data, it would be established that the sector does evaluate risks.

4.6 Conclusions from Interviews

The interviews would draw the survey questionnaires as a support for the 5 point interview question guide for answers. The derived appreciation would support the analysis of data and identified unforeseen events. The study would conclude on the unforeseen events as,

- Financial or economic matters,
- Legal,
- Environmental, and
- Labour issues.

In a nutshell, the study identified with the methods for minor projects, and would conclude that the sector would have methods of calculating and determining projects decisions.

5.0 EVALUATION OF THE RESEARCH

The evaluation of the study done would be on, 'investigation into the impact of project management models using capital budgeting tools as a benchmark, in the sector in Ghana'. The outcome would have various statistical tools for ascertaining the results.

5.1 Summary

The study would summarize the problem statements, the results of survey questionnaires and the concluding hypothesis as derived. The problem statements that would be required, for results from capital budgeting tools and project management models the sector would use, and other behavioural factors of the professional bodies in the sector would be: The apathy in employing non-qualified personnel for financial management tasks described as Accounting. These, therefore, Managers with non-financial management background such as Engineering with specialties in Mechanical and Electricals, would not appreciate the use of theories and models of capital budgeting for substantial financial injection decision-making. Determining capital budgeting tools the sector would use for Funding commitments. Determining project management models the sector would use for larger and smaller projects. Computing the financial loss of the investor, and considered risk analysis of some already done projects stack half-way for years with methods the sector uses.

The outcome examined would be with a proposed capital budgeting tool and a project management framework model for comparative analysis regarding the importance of models usage before embarking on a project. The survey questionnaires, interviews and observations done would achieve results from: Demographic Data of Respondents, Existence and Importance of Risks Evaluation Systems in Capital Projects, and Existence and Relevance of Capital Appraisal Systems in Capital Projects. The achieved results would facilitate as presented with graphical representations and hypothesis, ascertained for rejecting the null hypothesis. The rejected null hypothesis, 'the sector

has capital budgeting tools that serve as a benchmark with impact from project management models', would inform the findings and recommendations.

5.2 Findings and Discoveries

The findings and discoveries taken from the research questions put forth would have the answers to them, ascertained from the data analysis from the survey questionnaires and interviews. The findings for discoveries from the study would be; 1.6.2.1 can the impact of project management models on capital projects in the sector in Ghana, be investigated? In rating the relevance of project management systems, the sector would use, own system of a model. However, computing from NPV from the Emerging concept to Gantt chart the result would indicate a favourable outcome. Furthermore, the results from the hypothesis would achieve an informed outcome.

1.6.2.2 What are the capital budgeting tools serving as the benchmarks for investigating the impact of project management models on capital projects in the sector in Ghana? The ascertained result that would be for the financial method used would be the purported answer. The answer would drive the sector having appraisal systems. However, when external funding would be sort for, the sector would adopt the financial models of the External Funding Body. In furtherance, the hypothesis achieved would derive an informed discovery.

1.6.2.3 How are risks and uncertainties calculated on capital projects of the sector in Ghana? In evaluating the risks in capital projects, the achieved results would interpret that the outsourcing factor pushes risks to the third party vying for the project. Therefore, the sector would have its systems for such computations, but major projects would be outsourced.

1.6.2.4 How are capital projects in the sector in Ghana computed from project management and capital budgeting frameworks? In deriving the answer to this finding that the hypothesis results would be the discovery. Therefore, in ascertaining the resultants, the achieved outcome would be a discovery. The outcome computed statistically from the confidence level of 95% and discovering its strict variation, the confidence level tested would be from 99%. The resulting outcome that would not change would show that the strict variation would not have a significant influence on the decision rule.

5.2 Limitations

There would be limitations in the study as being: The study's findings and recommendations limited would be to the subject area. The sector's bureaucratic system of sourcing for primary and secondary data would be the limiting factor in the study. The results, where Managers to approve for the use of a facility would be unavailable, and deputies not ready for such commitments. The difficulty that would reflect the academic background of the human capital working on capital projects would also show. These officials, aligning their job functions to the appreciation of the concepts of capital budgeting and project management modelling, would communicate their non-readiness for arranged interviews and answering of survey questionnaires. However, the limiting factors identified would direct the affairs of the study. Though, this would reflect the quality answering to survey questionnaires and interviews done, yet inputs would drive to achievable results. The outcome from these would be used from the sampling method to achieve the recommendations realized from the findings and discoveries.

5.3 Recommendations

The investigative study on the impacting of project management models, using capital budgeting tools serving as benchmark in the sector, would recommend as follows: That, the phases of projects risks evaluation would have to be done. Risks about: Human capital as a resource, Legal inference, Weather profile pattern in need would be from the required sources. The sources, would be from the Meteorological Department, even though they have their challenges of instruments, but would have an approximation of higher resultant input for strategic financial decisions, Economic drivers, others, being unforeseen events of which can occur, whiles projects would be in force. That is, in summarizing terms projects risks would have to be determined from, Early identification and solution from the table point of view, Thorough risks evaluation and assessment, same and Ensuring litigation free projects, from In-house (labour issues) and External Environment of which classified would be the Stakeholders. Ensuring timelines for projects phases completion, and the proper inputs would be done to guard against deterioration of the completed project along the times, and Outsourcing projects would have to be financially fluid for planned projects done within estimated costs and adverse variances not realized. The study would recommend that Managers in positions of strategic financial decisions for capital projects would be equipped with financial, and project management training. These would be certification programmes for useful input into strategic value decisions. The project management framework guide would consider the 'table 1-1.2 of Project lifecycle, 5-process Groups and 4-D processes aligned'. These would feature the drive on gathering an appreciative model for the sector. The sectors' classification of funding and accounting would have to be studied. The concept would be from the Chapter 14 of the 1992 Constitution of Ghana, with other

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Legislative Instruments on governance. From the recommendations done, projects done in the sector would have comparative financial outflows budgeted with the sectors' financial and projects' methods.

5.4 Further Study and Research

In appraising the study for further research, various depictions ascertained on capital budgeting, in summary, would be used. The use of committed funds, cash outflows for projects done and later described as assets, from which cash inflows would realize as the value for the investor, all things being equal. The further study would, therefore, be proposed as: Determining the required rate of return on highly volatile projects in a country, Determining the behavioural inferences on construction projects in a country, and Assessing the financial recovery for social and economic projects of a country. The underlying topic of study would be the Sources and Costs of Capital about Corporate financing of debt and equity, where the results would show the value for the investor.

5.6 Conclusions

The hypothesis that would be concluding with the alternative decision that, 'the sector has capital budgeting tools that serve as a benchmark with impact from project management models', would be the discovery of the study. The conclusion would be as a result from the proportionate stratified random sampling method adopted. The hypothetical survey questionnaires' results with the confidence level of 95% test statistics, further derived with strict significant variation tests of 99%, would give the direction for accepting the same alternative hypothesis decision. The recommendations would be risks and uncertainties evaluation in capital projects, slowing or deteriorating completed projects with substantial financial injections mostly stacked half-way, not given the project management objective drive. Therefore, the importance would be the computing with the Emerging concept for profitable mindedness, of the sector stratified and the Gantt chart for project management impact.

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