

Examining the effect of Project Risk Management from the 4-D and 7-S models infrastructure in the Public Sector Organizations in Ghana

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Abstract

Ivan (2005, p.121) indicates that, 'Michael Bromwich [1976] was moved to write, The businessman's attitude may be also affected by the dominance of the firm's information system by accountants, who, in general, have not been trained in the techniques [of discounted cash flows] ..., and whose professional attitudes may possibly militate against their acceptance.' It further indicates that 'times have now changed, and discounted cash flows are part and parcel of the curriculum of the various professional accounting bodies' examinations. And yet, there are still some firms who cling on to older methods, even when they have become superseded by more scientifically valid techniques'. Ivan (2005, p.121). From this understanding, the study would determine the techniques about capital budgeting tools, and project management models the sector uses. Also, the other behavioural factors of the professional bodies in the sector would be identified, from these issues; the apathy in employing qualified personnel for financial management tasks, described as Accounting. The tendency where Managers with non-financial management background such as Engineering with Mechanical and Electricals, would not appreciate the use of theories and models of capital budgeting for substantial financial injection decision making would be done. The determinants of 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. The methods the sector would use for such projects would have to be determined. There would be proposed capital budgeting tool and project management framework model for comparative analysis in terms of the importance of models usage before embarking on a project. The survey questionnaires, interviews, and observations would describe the graphical consideration posture of the results that the problem statements would give out, for drawing the findings and recommendations.

Keywords: Project Risk Management, 4-D and 7-S models, Infrastructure Projects

1.0 INTRODUCTION

Projects would have to be 'accepted' beyond a reasonable doubt, which they are worth of embarking upon for the benefit of the investor. From the understanding ascertained, computations with requisite financial management models for analysis, before such a conclusion would come out has to be done. In determining the reasons for accepting projects as worthy for being embarked upon with substantial capital injections, there would have capital budgeting models. These models would give a high assurance that the projects tend to bring a real return on the capital injected, all things being equal. It is, therefore, from this understanding that the study would determine from the theoretical consideration with project management models. The required capital budgeting models for the study that would give the strength for accepting projects would be derived. These outcomes would come from the Non-Discounted Cash Flow (non-DCF), the Discounted Cash Flow (DCF) and other sophisticated mathematical models noted as supplementary. The non-DCF models of the Payback Period (PBP), Accounting Rate of Return (ARR) and Profitability Index (PI), would be identified as tools that do not consider the time value of money. However, 'historically, there was once a time when the time value of money was not recognized, and so techniques of investment appraisal relied on non-DCF methods', Ivan (2005, p.121). Therefore, it would be derived that various studies done before the 20th century had higher use of them. Ryan and Ryan (2002) determines, 'Miller (1960) through Mao (1970) and Williams (1970) to Pike (1996)¹, the Payback Period (PBP) and Internal Rate of Return (IRR)' dominates. The 'most popular capital budgeting tool' was the Net Present Value (NPV). The 'least popular capital budgeting tool' was the Accounting Rate of Return (ARR) and the Profitability Index (PI). In considering these, the DCF, would be further determined with other limitations on the subject matter.

Furthermore, the DCF models considering the time value of money, which comprises of the Net Present Value (NPV) and Internal Rate of Return (IRR) had a different result before the 20th century. The outcome from Ryan

¹ Ryan and Ryan (2002, p.11), 'Capital Budgeting Practices of the Fortune 1000: How Have Things Changed?', Exhibit 1, 'Comparative Results of Prior Studies', where 'the first 11 results were compiled from Scott and Petty (1984)', and the detailed data derived for further studies, confirms non-DCF dominates.

and Ryan (2002) on the 'Comparison of Basic Capital Budgeting Tools'² with always (100%), had 49.8%. Also, Always or Often ($\geq 75\%$) of 85.1% with an χ^2 significant within the particular capital budgeting method at the 0.01 level. These results would have the requisite impact on the choice of models the sector would use. The study would further clarify the other tools of, 'Relative Usage of Various Supplementary Capital Budgeting Tools'³. These would comprise of Sensitivity Analysis, Scenario analysis, Inflation Adjusted Cash Flows and Real Options, to mention but a few. It is from these capital budgeting tools that cost estimates would be derived from the strategic decision for the project, taking into consideration the weather of risks and uncertainties interplay. The study would further determine the challenges from the use of the DCF models, which along the period results from the sophistication of computation with the financial management tools. Given these, as the ages draw closely to the 21st century, the DCF in the nature of the NPV and other sophisticated models would be used. The Sensitivity Analysis, Decision Tree, and Monte Carlo Simulation would present investors' real expectation of wealth. The results technically would be the 'accept = +1.0' or 'reject = -1.0'⁴ of a project as the outcome computation would indicate from the study. The study would further draw the impact of these cost implications and theories for the project management models from the PMBOK Guide, of the PMI (Project Management Institute, 2008) that identifies the project lifecycle. The study would derive the project lifecycle from various project management models for analysis. These would come from the five (5) process groups (PMI, 2008, p.6).

The Project Management Institute (2008, p.5, PMBOK Guide), defines, 'a project is a temporary endeavour undertaken to create a unique product, service or result'. These unique products, services or results, would have to be further derived. The Project Management Institute (2008, p.6) derives, 'project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements'. The features from these definitions would give the insight of requisite models for use. The basics of the project's lifecycle and the five (5) process groups from the levels of initiation, planning, execution through to monitoring and controlling would illustrate the features. Also, for closing would be the techniques impacting the benchmark. The cost implication determined as a resource would also be through the lifecycle and the five (5) process group's levels. The Gantt chart, network analysis, and Pert/Scenario planning⁵ would form as some of the project tools and techniques that would come out for use. The capital budgeting tools would come out as the benchmark for the identified tools for valuable tactical decisions taken. The results would, therefore, be the project management models like the '4-Ds' and that of 'McKinsey 7-S model' for investigation. The 'McKinsey 7-S model' would be derived from the hard and soft elements as; Hard Elements are: Strategy, Systems, Structure, and the Soft Elements are: Shared Values, Skills, Staff, and Style. The study would again review the various literature on the model as, Akalua and Turner^b (2001, p.1) observe the capital budgeting methods and practices that four companies in different industries use. Their conclusion was specifying, 'that most companies follow decentralized project decision-making. Despite the use of DCF techniques, there is a tendency to combine with the newly crafted value management tools, which shows a trend shift in the capital budgeting methods'. Therefore, the practice of the sector⁶ would be determined from a similar position on the subject matter. The study in determining from this position, with capital budgeting models, would examine with project management methods the sector uses. This consideration would give the understanding of the practical to the theoretical appreciation for academics. The outcome would identify the uniqueness of the study as an academic experience from the derived topic.

The sector noted, provides various forms of projects funded from local and international commitments. These commitments are backed by financial management decisions computed with varied models for an expected value, further described in Accounting as profits, and from the sectors' objective as developmental benefits for society. It would acknowledge how investors inject substantial cash into projects done by organizations with the big dream of a good earning. In ascertaining the earnings envisioned now from the projects, capital budgeting tools like the non-DCF and DCF would be invoked to examine the worth of the projects. These computations would have results in terms of the realities on the ground from the questions and interviews granted. The sectors' activities would come from the varied professionals manning these various activities. The procedural manuals in directing their affairs would technically provide the results in achieving their percentage adherence and use. The sector drawn for the study would

² Ryan and Ryan (2002, p.12) Exhibit 2 for the detailed data derived.

³ Ryan and Ryan (2002, p.13) Exhibit 3 for further appreciation of the Various Supplementary Capital Budgeting Tools derived.

⁴ See Ivan (2005, pp.124-125), 6.4 Investment Appraisal: Discounted Cash Flow (DCF) techniques,' ... Projects with a positive NPV are acceptable...', gives an appreciation on the accept/reject computation for analysis.

⁵ The PERT model according to Klastorin (2003) serves as a tool that Managers of projects are able to use in tracking and for calculation of the projects' duration estimates.

⁶ Keywords and Abbreviations: public sector organizations in Ghana

come from the Utilities, Roads and Highways, Transportation and Industry to mention but a few. However, the sectors' system of choosing of projects would be identified. The sectors' uncertainties from investment appraisal systems for computing their costs and value would be done. These would be where the investment appraisal techniques of the DCF and the other advanced sophisticated tools would calculate for value, the cost/benefits analysis, and cost-effectiveness analysis. The result would be that a project would give the best value for money, when well defined. Notwithstanding, it would ascertain and establish the reality that, political expediency tends to overrule all these analyzes. Therefore, in embarking on uncertain and risky projects, it would be prudent to establish the sectors' models. These would clear the reasons, of which most often projects get-stack half-way. There would be problem statements in determining the question that it would be due to the neglect of project management processes. Also, the question of the sectors' models used would not adequately compute the rightful results for value, indicating as a 'big issue'. The study would also ascertain whether, qualified personnel to invoke the requisite computational models are used. These questions would generate results with the research methods for analyzes. Also, for projects' costs elements, the study would determine their requirements. In determining these costs factors, the sector would have to acknowledge the financial and project management manuals. The manuals analyzed would be with the conceptual models derived from capital budgeting and project management.

1.1 Scope of Study

The study's scope would draw the principles and concepts that impact project management models' such as the '4-D model of define, design, develop and deliver'. Also, the 'McKinsey 7-S model of shared-value, strategy, structure, systems, staff, style and skills', would also be used from projects perspective. These would inform the case study determination with the Gantt chart. The study would examine the capital budgeting tool of the Discounted Cash Flow (DCF) computation from the study's case data determination with the NPV, IRR and the Emerging concept to the sectors' used tools. The 'projects with a positive NPV are acceptable, and will increase the value of the firm by the value of the NPV' Ivan (2005, p.125). The principle, however, would not indicate that it would be considered acceptable. However, an NPV comparative analysis with other possible investment projects would have to be done for their order of preference. Therefore, 'projects with higher NPVs should be undertaken first' Ivan (2005, p.125).

Furthermore, DCF models that would be presumed to be the models considering the 'time value of money' would be reviewed. Therefore, it would be significant to know the tool that 'offers superior recommendations...important that the results have credibility' Ivan (2005, p.133). In furtherance, project management models and frameworks in the field would be drawn with features of importance and shortfalls. Where shortfalls ensue, the framework would be interpreted with the actual frameworks. Such would be like the 'Project Time Management' of the PMBOK Guide, PMI (2008, p.67) a 3rd concept of the nine (9) knowledge areas. The 8th concept of the nine (9) knowledge areas also discusses 'Project Risk Management'. That would be the conceptual framework, of which data gathered from the field would draw its composition for analysis on the study's direction. Thereby, the questions and interviews granted would be computed with statistical deductions for arriving at the hypothesis with its interpretation, and that would inform the data analysis of the study. Even though, the sector would have varied formats for embarking on projects from public institutions systems, the study would analyze these systems with quality planning concepts. Also, the investigation meted out would be with test statistic, which would give a discovery for academic knowledge built-up.

2.0 LITERATURE REVIEW

In acknowledging the foundations of project management, the PMBOK Guide, PMI (2008, p.5) defines, 'a project is a temporary endeavour undertaken to create a unique product, service or result'. The PMBOK Guide, PMI (2008, p.5), further clarifies the project management definition that, 'the temporary nature of projects indicates a definite beginning and end.' These unique results to a larger extent would realize from constructions and monumental structures like the Great Pyramid of Giza (2550-2530 BCE). The identified construction was done, over a timeline of 20years with the required resources of funds, materials, and workers achieved a satisfactory completion. However, the edifice remained the tallest structure until the completion of the Eifel Tower, as would be referenced in the definition of projects with a defined beginning and end.

The PMBOK Guide, PMI (2008, p.5) would further derive that, 'projects can also have social, economic and environmental impact'. The theory of which the Pyramid of Giza project (2550-2530 BCE) had an expectation for returns ensuing from economic drivers from different sectors of the industry through the increase in trade and workforce supply. This scenario would materialize in other construction and building projects like the Greek Parthenon project (447-438 BCE). The result created jobs and industries, and the Roman Colosseum project (69-79) which also created jobs, entertainment, and free benefits. The study would have to note such projects done.

Project timelines were paramount, typically from 5 to 15 years so that project sponsors mainly the rulers could enjoy the glory and the attached benefits from their projects during their reigns. This concept's affirmation would have to come forth. Therefore, reviewing the literature on project timeframes, the Pharaoh Khufu was 40 years old, and he was expected to live between 60 to 70 years. As such crafting from this expectancy, the Giza pyramid had a plan of 20 years timelines, committed with the requisite resources to accelerate its performance within the time frame. Given the underlying concept, timelines would be derived as a valuable tool in project management foundations, where various theories have been propounded to compute it in performance.

From the underlying understanding that the concept of Critical Path Method (CPM), as the 'longest path through connected activities in a schedule' Hartman (2005, p.21) had input. The reasoning would indicate that the activities found on the critical path would be those planned for decision-making. However, to an extent, the CPM, when computed, would give the right information on timelines for decision-making with bottlenecks. Therefore, it would assume that 'a classical CPM schedule does not give you all of the information you need to make the decisions' Hartman (2005, p.22), that would facilitate ending a project on time with the required resources. In furtherance, the knowledge areas obtained would derive as tools of the management processes, which would form the foundations of the concept of lesser recorded materials' era.

2.1 Development of Project Management

In deriving the development of project management, reviews of literature on the study postulate that, 'the construction industry was probably first to embody project management principles' Kerzner (2005, p.10). Whereas, Kerzner (2005, p.10) further drives that, 'the aerospace and defense industries following World War II' were the growth engineers of project management concept. As further knowledge developed over the years, according to Chiu (2011), Henri Fayol (1841-1925), developed the five (5) functions of management being, planning, organizing, commanding, coordinating and controlling. These functions constituted the basis of project management (Witzel 96-101), of which had the scientific concept basis. Also, that Henry Gantt (1861-1919) developed on Fayol's theory, the 'planning and control' technique called the Gantt chart (Stevens xxii) that allowed the processes of planning through to controls. A further appreciation of knowledge brings Frederick Winslow Taylor (1856-1915) with the resource allocation and work breakdowns. The era of the 1940s through to the 1960s, the government of the United States saw a massive appreciation of projects into the building of missiles, aerospace and various constructions with the application of project management principles developed.

According to Kerzner (2005, p.10), 'work was performed entirely sequentially'. From this appreciation, the concept that 'the sales force were gods, standing between the customer and the workers' Kerzner (2005, p.11) ensued. Therefore, when failure happens the attributable blame was for the workforce's project manager as team head. Whereas the 'the sales force' Kerzner (2005, p.11) rather received praises and bonuses of positive returns. The military did not accept the development since ranks in the military were held esteemed. The project managers of lower ranks could not give higher ranks orders on projects, therefore, had an effect on their promotion. In effect, project management development suffered from the military. Furthermore, due to financial constraints facing the private industry during the 1950s, the government facilitated the award of contracts 'to the second or third most qualified supplier just for the sake of keeping them in business' Kerzner (2005, p.11). Analytically, 'these contracts were basically bottomless pits of money, encouraging contractors to spend as much as they wished and then being paid a profit for whatever they could spend' Kerzner (2005, p.11). Therefore, this practice presently is an illegal concept, and the study would mention it. The contracts with a project manager in place as a requirement give the basis of acceptance, but the executed base of how it would be and managed was not an issue.

More so, the 'Table 1.1, Four periods of project management'⁷ Hoon Kwak (2005, pp.1-7), reviewed had great developments of project management tools to the present era of efficiency usage of the theories and concepts for projects. For efficiency, Fabris (1996), suggested for handling complex and interrelated project scheduling management, the Internet and specialized project management software packages. Some of the packages were the 'Primavera Project Planner' Hoon Kwak (2005, p.7), for the 'Iridium project' Hoon Kwak (2005, p.7). Through the era saw models and a framework for project management as in 1969, the Project Management Institute was founded in the United States (Harrison and Lock 34) according to Chiu (2011). The Guide to the Project Management Body of Knowledge has been an essential tool for the profession to date. The study would also review the underlying concepts the sector would use.

⁷ See the 'Table 1.1, Four periods of project management' Hoon Kwak (2005, pp.1-7), for the detailed review for the study.

2.2 Different Theories on Project Management

The concept of project management crafted through the era with different forms of theories would ascertain from the 'Table 1.1 Four periods of project management' Hoon Kwak (2005, p.2). This table derives the periods, theme and sub-context and maps them to periods before 1958, 1958-1979, 1980-1994 and 1995 to present era. Even though, the literature identified as capturing the table for the history of project management from the modern era, however, the study would ascertain different theories within the period. It would derive that the period 1900s to 1950s had the speed of communication, and as a result of the increase in technology advancement in the telecommunication systems. Therefore, Henry Gantt for effective allocation of resources for job specification derived the Gantt chart from which the Work Breakdown Structure (WBS) ensued. The literature identifies some of the projects that occurred within the era of, 'T. D. Judah's (1857) Project Plan for Building Pacific Railway, Hoover Dam (1931-1936) and Manhattan Project (1942-1945)' Hoon Kwak (2005, pp.2-3).

Furthermore, the Application of Management Science (1958-1979), as would drive the study, had major and significant advancement of technology of which Hoon Kwak (2005, p.2) indicates. That, 'between 1950 and 1979, several core project management tools, including CPM/PERT and Material Requirement Planning (MRP) were introduced' Hoon Kwak (2005, p.2), as different theories also in place. From these understanding, were produced specialized software packages for the CPM/PERT (Critical Path Method/Programme Evaluation and Review Technology). Some of the projects during the era were the 'Polaris Project (1956-1961), Apollo Project (between 1958-1972) and the ARPANET' Hoon Kwak (2005, pp.3-5). These projects as identified would have an in-depth review.

More so, the Production Center: Human Resources, (1980-1994) era, had the massive changes from 'mainframe computer to a multitasking personal computer that had high efficiency in managing and controlling complex project schedules' Hoon Kwak (2005, p.5). In line with these reviews that some project management models and frameworks developed from different theories for project efficiency, would have the requisite in-depth analysis. Project management process groups: The PMBOK Guide, PMI (2008, p.40) shows, the 'figure 3-1, Project Management Process Groups model'⁸. The project starts with the Initiating as a process, and then it 'requires the Monitoring and Controlling Process Groups to interact with the other Process Groups' PMBOK Guide, PMI (2008, p.40). These would be the Planning Processes and Executing Processes ending the project with the Closing Processes. These processes would derive as interlinking, and that the output from one process would be the input for another process.

Therefore the PMBOK Guide, PMI (2008, p.41) further defines the processes with 'figure 3-2, as Process Groups Interacts in a Phase or Project'⁹. The processes derive as the five (5) process groups would be determined as; Initiating process group, Planning process group, Executing process group, Monitoring and Controlling process group, and Closing process group. The level of interaction whereby within a timeframe for a project would be ascertained, from the beginning of a project to the end. However small or complex the project would be, the processes would be in place to invoke different theories as models and frameworks of; 4-D project management model, 'defining, designing, developing and delivery' of the project. The McKinsey 7-S model derive from the strategic management to project management had the, Hard approach: Structure, Strategy and Systems and Soft approach: Style, Staff, Skills and Share values. Gantt chart that presents activities for planning with computing a bar chart, and Work Breakdown Structure (WBS). These further processes according to the PMBOK Guide, PMI (2008, p.42), 'figure 3.3, Project Management Process Interactions'¹⁰, maps 'the 42 project management processes into the five (5) project management groups and the nine (9) Project Management Knowledge Areas' PMBOK Guide, PMI (2008, p.42). The 'table 3-1 Project Management Process Groups and Knowledge Areas Mapping'¹¹ PMBOK Guide, PMI (2008, p.43), would derive the mapping as the Knowledge Areas to the Project Management Process Groups, where the activities ensue.

Kozak-Holland, (2011) uses the standards from the theories as the basis for his presentations on, 'Lesson from the Titanic and the Great Escape'.

⁸ See PMBOK Guide, PMI (2008, p.40), 'Figure 3-1, Project Management Process Groups' model, for the theory of the figure.

⁹ See PMBOK Guide, PMI (2008, p.41), 'Figure 3-2, Process Groups Interacts in a Phase or Project' for the theory given.

¹⁰ See PMBOK Guide, PMI (2008, p.42), 'Figure 3.3, Project Management Process Interactions' for the concept and the model mapping.

¹¹ See PMBOK Guide, PMI (2008, p.43), 'Table 3-1 Project Management Process Groups and Knowledge Areas Mapping'. Mapping Knowledge Areas to the Project Management Process Groups' concept designed as a standard.

In a nutshell, the different theories would be put into frameworks as from the PMBOK Guide of the Project Management Institute, for an efficient standard for projects irrespective of size whether small or complex.

2.3.2.1 Project Management Models – Gantt Chart and CPM

The Gantt chart and Critical Path Method (CPM) as network analyses tools for projects' planning and control would have various cost implications. The tools for in-depth results discussion would be as following.

2.3.2.1.1 Gantt chart

The Gantt chart identified by Henry Gantt (1861-1919), as a network analysis would be a tool used for project planning and control. The model would facilitate the ideals of the 4-D model, Project lifecycle and 5 Process Groups determined and as aligned in the study. It would provide project activities graphically represented with horizontal bar charts. The bar length would represent the activity period designed, and as such the chart would present two bars. The first bar would represent the planned activity duration, while the second signifies the actual project duration. However, the first bar for the planned activity would mostly start as it would track the status of each activity occurring within the timeframe. The Microsoft Excel would be used to compute the table with the processes, which would show the result of the project deadline. Some advantages of the Gantt chart would be: The interaction enfolding has an easier pictorial presentation, the activities vital in easily carrying out a project are recognized. A disadvantage would be: There is no pointer as to the conclusion of an activity. The Gantt chart would further develop stratified to showcase the case study data processed from the interview.

2.3.2.1.2 Critical Path Method

Hartman (2005, p.21) indicates that, the CPM would be, the 'longest path through connected activities in a schedule', that would take the required timelines for cost effective decisions of a project's valuable outcome. The critical path method (CPM) would, therefore, approximately calculate the length of time for the project, and establish the quantum of time on the network paths within the planned period. Furthermore, the model would calculate the earliest and latest start periods, and the earliest and latest finished periods without, the consideration to the value of the project. The model's total float identified would be, the period that an activity would delay from the earliest start period, with no setback to the end period of the project. It, therefore, would indicate, where, the critical path would show zero as the float. These would be the nodes, where float on the activity can easily be worked out to identify any shortfall on the critical path. Therefore, in developing the CPM, the duration of the project would ascertain as matching the activity on deadlines. However, there would be a problem where there would be third party contract evolving. The outcome of the model would show a wicker control system. Also, it would show difficulty in calculating for projects. Some advantages are: It gives a good pictorial representation of activities on nodes, also, it displays an interdependency for the project movement, it arranges from the starting project to the ending project within a timeframe. However, issues relating to these calculations would show that value is a limitation of the model.

2.4 Historical Thinking of Project Management

The definition of project management would be by the PMBOK Guide, PMI (2008, p.6), as, 'the application of knowledge, skills, tools and techniques to project activities to meet project requirements'. The features of the definition would show in construction projects. It would be from other projects done during the ancient civilization, gathered from Mesopotamia through Greece to the Roman Empire. The buildings and structures in the form of pyramids of Rome and the ziggurats of Mesopotamia virtually fall within the scope of the theory.

According to Chiu (2011), the great impression given since, the 'four periods of ancient Western history in Mesopotamia, ancient Egypt, ancient Greece, and the Roman Empire, representing a timeline of over 3,500 years up to the 5th century AD', would show the application of construction. The related 'knowledge, skills, tools and techniques' used during the era of projects were outstanding, epitomizing the implementation of these concepts. These realized epitomes as references would be the evidence emanating from the five (5) process cycle of initiating, planning, executing, monitoring and controlling. They would further close to the nine (9) knowledge areas of project management. These would refer to the 'resources of the ages for building great edifices that have stood the times as emoluments for tourists' attractions, of which also is indicated by Kozak-Holland, (2011). The framework of knowledge projects spread speedily as (Fargis 262) indicates by Chiu (2011), from the Mediterranean bringing on board the ancient Greece to the Roman Empire. It showed after the fall of the Roman Empire at around AD 476, ascribed by (Fordham) according to Chiu (2011), at the beginning of the medieval era projects.

Further on, the knowledge of projects in construction, buildings and structures indicated by Chiu (2011), the 'Great Ziggurat' of Ur, stood at 21.3 metres tall, then by 45.7 metres of 61 dimension, was a Mesopotamia tower-

shrine during the reign of Ur-Nammu, circa 2114-2096 BC (Klein 36). These constructions during the years used slaves and peasants to complete the constructions (McIntosh 83), indicates how projects done during the era, supports the derived knowledge application. The historical thoughts technically would have the embodiment of project management frameworks with cost computation though not quite significant but involves. The 'brief history of project management, Table 1-2'¹² Hoon Kwak (2005, p.7), would have the requisite frameworks derived from technology through management science to the project office for the periods, 'afar to 1958, 1959-1979, 1980-1994 and 1995 to current stage.'

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-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 research¹³ 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 use the stratified sampling format of the proportionate stratified random sampling for analysis, for reducing error. 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'.

¹² See, 'A brief history of project management, Table 1-2', Hoon Kwak (2005, p.7), where the period 'from inception through to the current stage', is mapped as reviews from the concepts from 'Technology, Management Science, Project Management & Technology, Major projects and Project Office'.

¹³ See Rajasekar et al. (2013, pp.2-3), What are the Objectives of Research? With 6 identified principles of note.

These components when reviewing the work of Blaxter et al. (2006, p.63), have been defined by the ‘research families, approaches and techniques’¹⁴ 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
- 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 principles¹⁵ 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 University¹⁶ 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. Cochran: “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 stratification¹⁷ would be used to compute valid

¹⁴ See Blaxter et al. (2006, p.63), Box 3.3, Research families, Research approaches and Research techniques inline to this theory derived.

¹⁵ See Smith’s (2003, pp.56-62), Five Principles for Research Ethics being;

- i. Discuss the intellectual property frankly,
- ii. Be conscious of multiple roles,
- iii. Follow informed-consent rules,
- iv. Respect confidentiality and privacy,
- v. Tap into ethic resources.

¹⁶ 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

¹⁷ See SAS OnlineDoc (1999, p.153), The reasons for stratification would be,

1. Ensure an adequate same size, and

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;

$$n = N \cdot S_f$$

where, S_f is denoted as sampling fraction being S_f

therefore, the sample size computing would be; $S_f = n/N$

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
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, $\chi^2 =$

$$\sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$$

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	w	x	w + x
question ii	y	z	y + z
totals	w + y	x + z	w + x + y + z

Therefore, fixing the derived values into the formulae would be;

Table 7-3.4.2 2 x 2 contingency table chi-square statistics

$$\chi^2 = \frac{(wz - xy)^2}{(w + x)(y + z)(x + z)(w + y)}$$

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.

2. Improve the precision of the results.

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;
 - o =CHIIINV(error, df)
 - o where, error would be the probability given as $p\text{-value} \leq 0.05$ (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 $(2-1) \times (2-1) = (1) \times (1) = 1$
 - o More so, chi-square critical value would be, =CHIIINV(0.05, 1) = 3.84
 - o The chi-square critical value would then be compared with the chi-square χ^2 value to establish the higher value and decide for the hypothesis.
- iii. The decision for the hypothesis would be made, where $p\text{-value} \leq 0.05$, and the chi-square χ^2 value being higher than the chi-square critical value, at 95% confidence level, the H_0 would be rejected, and H_1 accepted.

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

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 $p\text{-value} \leq 0.01$ (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, =CHIIINV(0.01, 1) = 6.63. Invariably, the $p\text{-value} \leq 0.01$ would give the chi-square critical value as 6.63, from the 99% confidence level, while the $p\text{-value} \leq 0.05$ 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 $p\text{-value}$ 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.

- o 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.'¹⁸ 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;

¹⁸ See Dawson (2002, p.88), for the advantages of closed questions reviewing the concept applied.

- 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,
 - 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 taken¹⁹.

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. The considered survey questionnaire and interview questions for the study would be provided as Appendix I and Appendix II.

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.

¹⁹ 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.

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 (17years) 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;

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 9-4.1.1 Extracts 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 Development Jobs	228,661.17

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

cash inflow (initial inflow)	52,193,745.89
discounting valuation	47,448,859.90
add: cash outflow (initial investment)	- 41,159,889.66
NPV	6,288,970.24
IRR	-13%

Table 11-4.1.1 Determining Emerging concept from 2011 Budgeted Annual Cash Flow Extracts – Regional (Ashanti West/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)
A	Installation of Pole works	4
B	Stranding of conductors	3
C	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 payment	1
	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 set-timing 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 project

Activity Description	Weeks						
	1-3	4-6	7-9	10-12	13-15	16-18	19-21
Installation of Pole works							
Stranding of conductors							
Installation of overhead types of equipment							
Burying of cable works							
Installation and testing of Transformer(s)							
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 14 population 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.

Table 1 Response Achieved – Survey questionnaires

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



Figure 1 Analysis of Response Achieved – Survey questionnaires

Table 2 Response Achieved – Interviews

Respondents	Responses	Percentage (%)
Managers	2	14.29
Supervisors	7	50.00
Direct Reports	5	35.71
n=	14	100

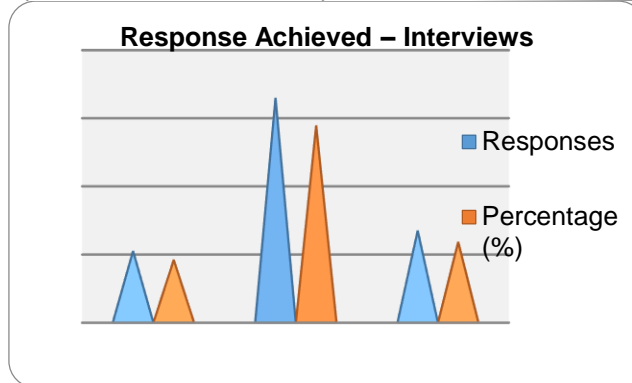


Figure 2 Analysis of Response Achieved – Interviews

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;

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

Table 3 Educational Level of Respondents

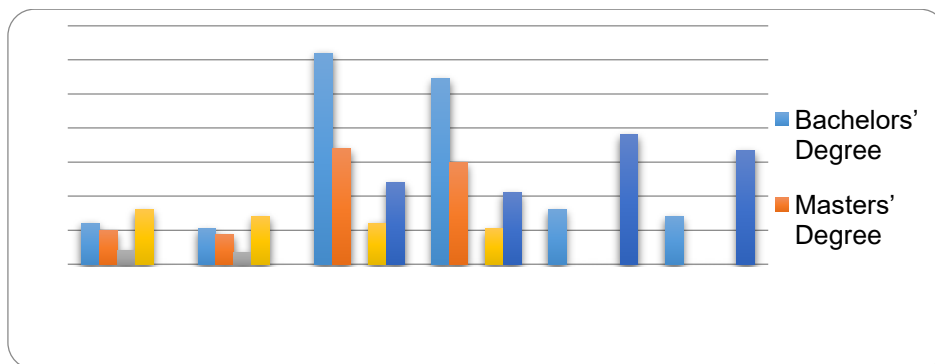


Figure 3 Analysis of Educational Level of Respondents

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.

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

Respondents' per activity		Strongly agree	Agree	No idea	Disagree	Total
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 Reports	Frequency	8	12	4	3	27
	Percentage (%)	7.02	10.53	3.51	2.63	23.68

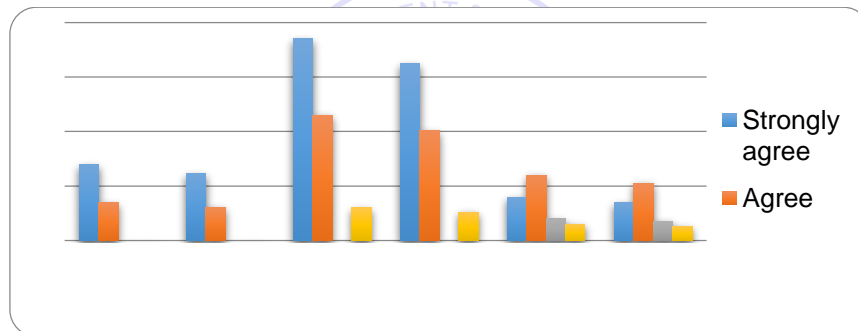


Figure 4 Analysis of Importance for considering risks and uncertainties in capital projects decisions

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%.

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

Table 5 Risks Evaluation of on-going capital projects.

Activity	Frequency	Percentage (%)
Yes	32	28.07
No	58	50.88
Non	24	21.05
Total	114	100.00

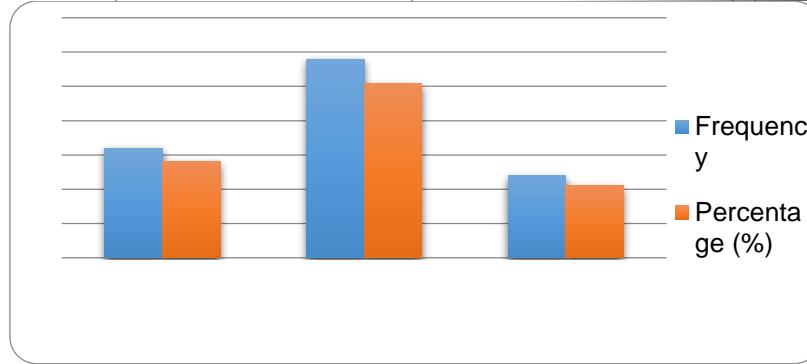


Figure 5 Analysis of Risks Evaluation of on-going capital projects.

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%;

Table 6 Financial Appraisal method in capital projects.

Descriptors (Frequency)	AO1	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

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 (Frequency)	AO1	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

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

Table 6.1.1 Deriving Expectancy Frequency

$$\frac{63 \times 54}{114} = 29.84,$$

Table 6.2 Expectancy

Descriptors (Frequency)	AO1	AO2	AO3	Total
Own system	29.84	23.76	9.39	63
Recognized Financial 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, χ^2

Observed (O)	Expectant (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 = χ^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, $=\text{CHIINV}(0.05,4)$, with the result of 9.49. Furthermore, the p-value would be ≤ 0.05 at the confidence level of 95% significant. In drawing the decision, $p\text{-value} \leq 0.05$ signifying a 95% confidence level of χ^2 of 18.72, critical χ^2 of 9.49, the study would reject H_0 and accept H_1 .

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) $p\text{-value} \leq 0.01$,

- $(df) = 4$
- $\chi^2 = 18.72$
- critical $\chi^2 = 13.28$
- Therefore, the decision rule at 99% significant confidence level would come forth from analyzing the concept. The study would, therefore, reject H_0 and accept H_1 , 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.

Table 7 Rating of Unforeseen Events in Capital Projects Decisions.

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

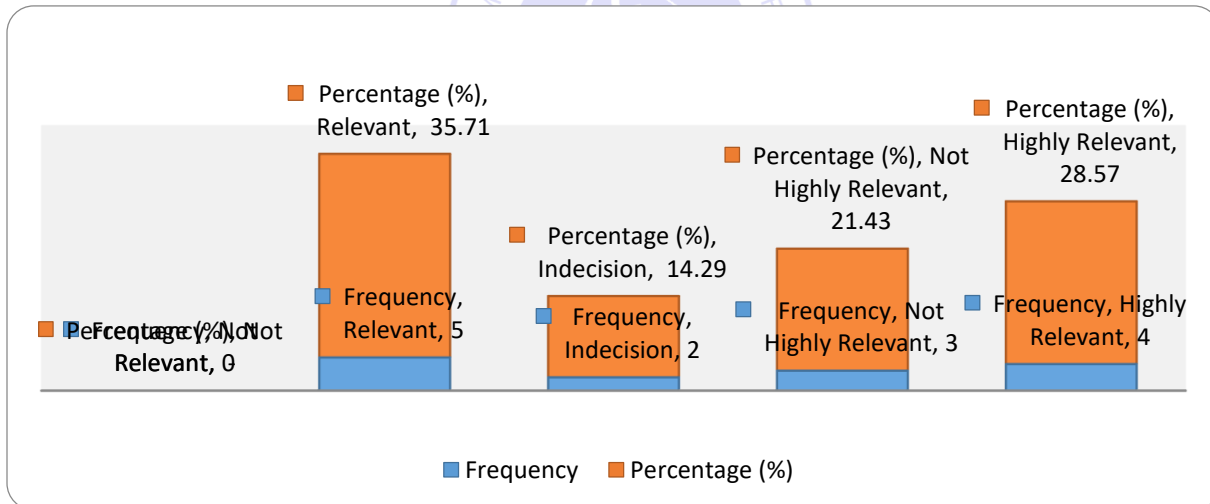


Figure 7 Analysis of Rating of Unforeseen Events in Capital Projects Decisions.

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 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.

Bibliography

- A Guide to the Project Management Body of Knowledge, (PMBOK® Guide), 2000 Edition, Project Management Institute, USA
- A Guide to the Project Management Body of Knowledge, (2008) (PMBOK® Guide), Fourth Edition, Project Management Institute, Inc., USA

- C. Paramasivan and T. Subramanian, (2008), *Financial Management*, 1st Ed., New Age International (P) Limited, New Delhi, India.
- Catherine Dawson, Dr (2002), *Practical Research Methods, A user-friendly guide to mastering research techniques and projects*, How To Books Ltd, Oxford, United Kingdom.
- C.R. Kothari (2004), *Research Methodology, Methods and Techniques*, 2nd Revised Edition, New Age International (P) Ltd., Publishers, New Delhi.
- Esbjörn Segelod, Karin Berglund, Erik Bjurström, Erik Dahlquist, Lars Hallén and Ulf Johanson (2011), *Studies in Industrial Renewal Coping with Changing Contexts*, Edited, Mälardalen University, Eskilstuna-Västerås, Sweden
- Frank J. Fabozzi, and Pamela P. Peterson, (2002), *Capital Budgeting: Theory and Practice,; Capital Budgeting Evaluation Techniques, and Capital Budgeting and Risk*, John Wiley & Sons Inc., New York, NY
- Frank J. Fabozzi and Pamela P. Peterson, (2003), *Financial Management & Analysis*, 2nd Ed., John Wiley & Sons, Inc., Hoboken, New Jersey.
- Gibaldi, Joseph, (2003), *MLA Handbook for Writers of Research Papers*. 6th Ed. New York.
- Ivan K. Cohen, (2005), *Focus on Financial Management*, Richmond, American International, University of London, Imperial College Press.
- Ivo Welch (2009), *Corporate Finance: An Introduction*, Brown University, Prentice Hall, New York, Pearson Education, Inc.
- J. William Petty, Arthur J. Keown, David F. Scott Jr., John D. Martin, Michael Burrow, Peter Martin and Hoa Nguyen, (2006), *Financial Management*, 4th Ed., Pearson Education Australia.
- Loraine Blaxter, Christina Hughes and Malcolm Tight (2006), *How to Research*, Third Edition, Open University Press, McGraw-Hill Education, England
- Mark Kozak-Holland (2011), *The History of Project Management (Lessons From History)*, Lakefield, Ontario, Canada: Multi-Media Publications, Inc.
- Nicholas Walliman (2011), *Research Methods: The Basics*, Routledge, Taylor & Francis Group, London & New York, NY.
- Richard A. Brealey, Stewart C. Myers, Robert C. Merton and Franklin Allen, (2011), *Principles of Corporate Finance*, Tenth Edition, McGraw-Hill/Irwin, Inc., New York, NY
- Robert Alan Hill, (2008), *Strategic Financial Management*, [Online], 1st Ed., Finance & Ventus Publishing Aps. (Available at: <http://bookboon.com/en/strategic-financial-management-ebook>, [Accessed: 8th January, 2014]
- Stuart MacDonald & Nicola Headlam (1986), *Research Methods Handbook*, Introductory guide to research methods for social research, The Centre for Local Economic Strategies (CLES)
- Y.C. Chiu (2011), *A History of Ancient Project Management: From Mesopotamia to the Roman Empire*, Kindle Edition, Delft, The Netherlands: Eburon Academic Publishers.
- Yogesh Kumar Singh, (2006), *Fundamental of Research Methodology and Statistics*, New Age International (P) Limited, Publishers, New Delhi
- Bernstein, P. (1995), *Risk as a History of Ideas*, Financial Analysis Journal, pp.1-5, Jan-Feb 1995.
- CIMA Official Study Text (2013), *Enterprise Management*, Kaplan Publishing, UK.
- Karolina Koleczko, (2012), *Risk and uncertainty in project management decision-making*, Public Infrastructure Bulletin, 8-1-2012, Article 13, Vol. 1, Issue 8, pp. 76-83
- Mark Kozak-Holland, (2011, 2013), *History of Project Management*, “Lessons From the Past that Assist the Projects of Today to Shape the World of Tomorrow” (online), www.lessons-from-history.com
- Mark Kozak-Holland, (2011, 2013), *Project Maine*, Project Lessons from The Great Escape, PMI Maine program Jan. 13 to explore why WWII effort succeeded, Maine Chapter newsletter, Project Management Institute, January 2011, 829-9942, (online), www.pmimaine.org
- Payam Hanafizadeh, Allemeh Tabataba’I, Ahad Zare Ravasan, and Allemeh Tabataba’I, (2011), *A McKinsey 7S Model-Based Framework for ERP Readiness Assessment*, International Journal of Enterprise Information Systems, Vol. 7(4), pp. 23-63, (October-December 23 2011)
- R. Scott Widen (2008), *Financial Theory and Investment Banking Valuation Practice*, Nyu Journal of Law and Business, Delaware Law, Vol. 4, pp.579-604.
- S. Rajasekar, P. Philominathan, V. Chinnathambi and Srivaikundam (2013), *Research Methodology*,
- SOAS, University of London (2009, 2012), *Research Methods*, Course Introduction and Overview, Centre for Financial and Management Studies.

- Susan F. Haka, (2007), *A Review of the Literature on Capital Budgeting and Investment Appraisal: Past, Present and Future Musing*, in Handbook of Management Accounting Research, 1st Ed., Volume 2, Elsevier, UK, pp. 697-728
- Tom Seymour and Sara Hussein (2014), *The History Of Project Management*, International Journal of Management & Information Systems – Third Fourth 2014 Volume 18, Number 4
- The Constitution of the Republic of Ghana (1992), Chapter Fourteen (14) The Public Services, Made: 8th Day Of May, 1992, Gazette Notification: 15th May 1992, pp. 1-188
- Vicent T. Covello and Jeryl Mumpower (1985), *Risk Analysis and Risk Management: An Historical Perspective*, *Risk Analysis*, Vol. 5, No. 2, pp.103-20, (Re-printed and used with permission of the Society for Risk Analysis, Chpt. 3, Part 1, Beginnings, pp.33-54.
- Young Hoon Kwak and Frank T. Anbari (2008), *Analyzing project management research: Perspectives from top management journals*, International Journal of Project Management 27 (2009) pp. 435–446, accepted 14 August 2008, Elsevier
- Beki Grant and Kymberly Kelly (2009), *The Evolution of Project Management*, [Online] (Available at), http://www.xchangor.com/history_of_pm.htm, [Accessed: 28th April 2015]
- Bruce Simmons, *Chi-Square Tests Using Excel: Chapter 15*, CCC Math 244 Excel, Math 244 Statistics II, Clackamas Community College, [Online], (Available at): <http://www.brucesimmons.com/excel244chisquare2wayTestStat.p-value.html>, [Accessed: 14th February, 2014]
- ECG Approved Budget for 2011 Cash Flow: [Online], (Available at): <http://intranet/Reports/Budgets/Budget%20Reports%202008/Forms/AllItems.aspx?RootFolder=%2fReports%2fBudgets%2fBudget%20Reports%202008%2fYear%202011%20Budget%20Report&FolderCTID=%2f91029388-DE38-4E08-A995-457CF9E173B3>, [Accessed: 25th June, 2014]
- [Explorable.com](http://www.explorables.com) (2009), *Stratified Sampling Method, Proportionate Stratified Random Sampling*, [Online], (Available at): <https://explorable.com/stratified-sampling>, [Accessed: 24th August 2015]
- Henry Gantt's legacy to Management is the Gantt Chart, Major Milestones in Scientific Management (1850-1970), [Online] (Available at), <http://www.ganttchart.com/history.html>, [Accessed: 24th April 2015]
- *Intro to Hypothesis Testing in Statistics*, mathtutordvd , Published: Aug 20, 2014, [Online] (Available at), <https://www.youtube.com/watch?v=VK-rnA3-41c>, [Accessed: 17th August 2015]
- Lico Reis (2011), (Roberto de Paula Lico Júnior) *Dictionary of Financial and Business Terms*, [Online], (Available at): <http://www.slideshare.net/ASHRAFELSHERBINY/dictionary-of-financial-and-business-terms-6605002>, [Accessed: 24th April 2015]
- National Audit Office, *Financial Management Maturity Model*, [Online], (Available at): [www.nao.org.uk/wp.../02/financial_management_maturity_model.pdf](http://www.nao.org.uk/wp-content/uploads/2014/02/financial_management_maturity_model.pdf), [Accessed: 27th February, 2014]
- *Project management handbook*, [Online] (Available at), <https://www.projectmanagement-training.net/book/index.html>, [Accessed: 27th April 2015]
- Theme Horse (2014), *Statistics How To, Support or Reject Null Hypothesis in Easy Steps*, WordPress, [Online], (Available at): <http://www.statisticshowto.com/support-or-reject-null-hypothesis/#general%20p>, [Accessed: 14th February, 2014]
- *The History of Project Management*, [Online] (Available at), <http://www.projectmanagesoft.com/guide/the-history-of-project-management>, [Accessed: 24th April 2015]
- *The History of Project Management: Frederick Taylor and 19th Century Peak Performance*, [Online] (Available at), <http://www.brighthubpm.com/monitoring-projects/11643-pm-history-frederick-taylor-and-19th-century-peak-performance/>, [Accessed: 24th April 2015]
- *The History of Project Management*, Five key periods in the evolution of project management practices and principles, 'The History of Project Management: Frederick Taylor and 19th Century Peak Performance; Gantt and the Early 20th Century; Change Through the 1950s; Late 20th Century Process and Improvements; Into the 21st Century, [Available Online, ref.], <http://www.brighthubpm.com/monitoring-projects/11643-pm-history-frederick-taylor-and-19th-century-peak-performance/>, [Accessed: 24th April 2015]
- University of Minnesota's Center for Bioethics, (2003), *A Guide to Research Ethics*, (online), www.bioethics.umn.edu, [Accessed: 24th April 2015]
- William N. Goetzmann, *Financing Civilization*, [Online] (Available at), <http://viking.som.yale.edu/will/finciv/chapter1.htm>, [Accessed: 27th December, 2014].

