

# The Institutionalization of the Product of Financial Engineering Techniques on Listed Commercial Banks in Ghana

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## ABSTRACT

Well-considered financial engineering initiatives are what propel company success and general economic growth. This book aimed to improve knowledge of financial instruments used in project financing and the financial engineering process; however, no research has been done on the influence of financial engineering on the financial performance of commercial banks in Ghana. This study employed a descriptive survey design and a quantitative methodology to gather information on the influence of financial engineering on building project financing in Ghanaian commercial banks.

The treatise concentrated on the banking industry with a spotlight on banks listed on Ghana Stock Exchange with operations in the Accra Metropolitan Assembly only, and both primary (questionnaire) and secondary (audited financial records) data were employed to analyse the treatise. The secondary data were analysed descriptively, while the analysed data were analysed proportionally. The regression technique was adopted to explore the relationship between financial engineering and building project finance. The results show a significant but negative association between the project finance market and project finance. Also, there was a powerful but positive association among the selected commercial banks between project finance instruments, market innovation and project finance. The treatise concludes that commercial banks in Ghana have adopted various financial engineering strategies to improve project finance and, by extension, financial performance. This treatise recommends that commercial banks in Ghana employ product innovation strategies such as product range extension, product replacement, product improvement, product repositioning and new product introduction to enable the banks to be more productive, grow faster, invest more and earn more profit.

**Keywords:** Financial Engineering, Credit Management, Forex funds, Derivative Trading

## BACKGROUND TO THE STUDY

In the world of today's international and dynamic competitive environment, financial engineering is becoming more and more relevant, mainly as a result of intense global competition, fragmented and demanding markets, and diverse and rapidly changing technologies (Anokhin, Wincent, Parida, Chistyakova & Oghazi 2019). Competitive advantage, derived from financial engineering, is increasingly derived from knowledge, technological skills, and experience in creating new products (Distanont & Khongmalai, 2018). Nevertheless, the experience of advanced countries has demonstrated that a shift in government's industrial policy-making towards a technological innovation-driven economic strategy is life-threatening. A key sector in driving this agenda is the banking sector because it is well-thought-out as one of the most important economic sectors and is the most seductive and influential one in the growth of countries' economies (Tongurai & Vithessonthi, 2018). Therefore, banking institutions must play a catalytic function in developing a technological innovation-driven economy. However, technological innovations affect the financial performance of banks through their ability to increase their profits and reduce costs (Chaarani & Abiad, 2018). This corroborates the use of

investment strategies in private commercial banks in electronic services to appear on a small scale, ineffective in meeting a suitable environment for growth (Mwende, Muturi & Njeru, 2019).

Recently, the entry of non-banking institutions into the field of financial work has been observed, forcing financial and banking institutions to provide a comprehensive range of financial and banking services and thus increasing the functions of commercial and investment banks (World Bank, 2021). As a result, a new type of bank has also emerged, known as comprehensive banks, which use financial engineering technology. Financial engineering is the product and process innovation in the financial industries, developing new financial instruments and processes to enhance shareholders, issuers or intermediaries' wealth (Baporikar, 2018).

Project finance has historically been a financing vehicle for infrastructural development. It is crucially essential for access to finance because if the current rate of underinvestment is maintained, the world will fall short by 350 billion a year of much-needed infrastructure projects to support expected economic growth (McKinsey & Company, 2016). If the UN Sustainable Development Goals are considered, this figure roughly triples with a high concentration of needs in developing countries (Pardo, 2019). More recently, however, private firms have begun to finance infrastructure development using project finance. Project finance is the financing of a particular economic unit in which a lender is satisfied to look initially to the cash flow and earnings of that monetary unit as the source of funds from which a loan will be repaid and to the assets of the economic team as collateral for the loan (Pinto, 2017).

Accordingly, it is the raising of funds to finance an economically separable capital investment project in which the providers of the fund look primarily to the cash flow from the project as the source of funds to service their loan and provide a return on their equity invested in the project. Project finance is the most effective way to finance certain kinds of assets. It further involves financing projects by the private sector through limited or no recourse financing. In broad-spectrum, it is safeguarding finance mainly against cash flows caused by a single system (the project), with little or no recourse to the other entities involved in its realisation (Hayes, 2019). Finally, it involves a corporate sponsor investing in and owning a single-purpose industrial asset through a legally independent entity financed with nonrecourse debt. The definition recognises three critical decisions related to the use of project finance.

First, there is an investment decision involving an industrial asset. It is essential to differentiate between stock and flow-type projects. In stock-type projects, firms extract resources like oil, sell the proceeds to service debt, and generate equity returns until the resources are exhausted (Dafermosa, Nikolaidi & Galanis, 2017). The emphasis highlights an organisation's decision to create a legally independent entity that owns the asset. Project finance typically represents a form of off-balance sheet finance, meaning that project assets and liabilities do not appear on the sponsor's balance sheet (Baporikar, 2018). Although that one can distinguish project finance from these other financing vehicles, the boundaries are not precise. The definition also highlights the fact that project finance involves the confluence of interacting structural decisions. It is a cheaper and more effective way to finance certain assets. Numerous projects worldwide have been appreciated through project financing (Pardo, 2019). The implication is that most of these projects have been infrastructure projects; however, more recently, there has been a significant diversification as the concept of project finance is applied to numerous other sectors. Stated differently, the public sector consults the private sector to make available infrastructure usually provided by the state; concessions contracts are typically how the private sector's involvement is implemented.

However, as a developing country, Ghana still lags severely in infrastructural growth compared to the demand for more amenities. It is estimated that Ghana has a population growth rate of about 2.5% annually. The implication of this is that there is a greater need for faster infrastructural growth. The infrastructural deficit cannot be manned by the government alone. There has to be a collaborative effort from firms in the construction sector; If firms must participate, then it is evident that they will need access to funds as most construction projects are capital-intensive. Unfortunately, very little has been done in research that narrows down the impact of financial engineering on building project financing among commercial banks in Ghana.

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## Problem Statement

Under current business conditions, financial engineering activities drive business success and overall economic development. Engineering absorbing real and substantial costs and the clarity of organisational objectives in innovation has led to an increased emphasis on evaluating return on investment. However, Doyle (2015) observes that systematic evaluation rarely occurs within organisations. As a result, making causal connections between investment in innovation future management performance, and organisational success is externally difficult. Al-Khero, Janudin and Ahmed (2019) established a statistical link between the incidence of financial engineering and company performance. However, the majority of municipal authorities in Africa have not been able to take advantage of emerging forms of large-scale infrastructural financing, such as municipal bonds and public-private partnerships, because of undeveloped capital markets and a lack of necessary regulatory structures to bolster the confidence of private investors (Gorelick, 2018; Odoom, 2017; Oji, 2015).

Skibiński (2015) observed the sources of innovation of small firms in Europe, which adopted a pattern of innovation strategy that highly depended on external sources; he contended that external innovation resources claimed the most significant contribution to forming a firm's technology competence. Pardo (2019) asserted that, judging from the analysis of airport planning in the USA. In contrast, traditional financing schemes rely exclusively on contractual terms to reduce risks to lenders; an engineering-based framework to mitigate demand and credit risks is imperative to complement current approaches. Due to the differing nature of contractual and financial arrangements, some risks are particular to projects financed by the private sector. One, if not the most, fundamental aspect of privately financed projects is the financial engineering that accompanies the project proposal, and it is with this aspect of project finance that this study is concerned. In essence, financial engineering could make or break a project, and it is against this backdrop that project finance focuses its attention.

The literature review shows thus there have been several studies on commercial banks in Ghana. Bonful (2019) studied the finance and performance of firms in the construction sector of Ghana. Asante and Helbrecht (2019) studied the urban dimension of Chinese infrastructure finance in the Kotokuraba Market Project, Ghana. These studies focused on innovation processes and financial innovation as a strategy. They thus did not cover the effects of financial engineering on the project finance of commercial banks in Ghana. None of these studies has focused on the effect of financial engineering on building project finance among commercial banks in Ghana. This research focusing on the effects of financial engineering on building project finance among commercial banks in Ghana is a modest attempt to bridge the gap built by the passage of time with significant changes occurring due to the global economic crisis, among other factors. It is an effort to bring to light the influence and insights into the effects of financial engineering as a factor affecting project finance among Ghana banks. This study, therefore, sought to fill the gap in knowledge by investigating the impact of financial engineering on building project finance among commercial banks in Ghana.

## General Objective

The main objective of this research is to improve the understanding of financial instruments used in project financing and the process of financial engineering.

## Secondary Objectives

- Evaluate the project finance market and its effect on project finance among selected commercial banks in Ghana
- Explore the instruments used in financing projects and their effect on project finance in today's market among selected commercial banks in Ghana
- Examine the relationship between investment strategies and project finance among selected commercial banks in Ghana
- Examine product innovation strategies and their effect on project financing among selected commercial banks in Ghana

## Research Questions

- How often is the project finance market, its origin and development, as well as determining its current form evaluated?
- How accurate are the instruments used in financing projects, development and application in today's market explored?
- What is the relationship between investment strategies and project finance among commercial banks in Ghana?
- What is the relationship between product innovation strategies and their effect on project financing among selected commercial banks in Ghana?

## LITERATURE REVIEW

### Foundation of the Study

Financial engineering is the phenomenon of product and/or process innovation in the financial industries, the development of new financial instruments and processes that will enhance shareholders', issuers' or intermediaries' wealth. Khraisha, T., & Arthur, K. (2018) lists countless recent financial innovations from adjustable rate preferred stock to zero coupon convertible debt - but these all can be classified into three principal types of activities: securities innovation; innovative financial processes; and creative solutions to corporate finance problems Blanchard, K. (2020) suggests that the conceptualizations about what innovations are closely wrapped up with what it is for, hence, to a large extent, conceptualizations have to be inferred from treatments of its objectives.

Traditional definitions tended to place emphasis on conscious intent as an elemental feature, emphasizing the formal, planned and deliberate aspects of the financial engineering process. Financial engineering strategy provides a clear direction and focuses the effort of the entire organization on a common financial engineering goal Friedrich, J. (2021). Management needs to develop the strategy and communicate the role of financial engineering within a company, decide how to use technology and drive performance improvements through the use of appropriate performance indicators. Albers-Garrigos, J., Igartua, J. I., & Peiro, A. (2018). Suggested that the first step in formulating an innovation strategy is to define what innovation means to the firm or the areas of focus in terms of innovation. By understanding the drivers of innovation needs, a firm can develop its focus areas for innovation. The importance of having a clearly defined new innovation strategy guiding the innovation process was recognized by Biemans, W., & Griffin, A. (2018). Financial engineering strategy needs to specify how the importance of innovation will be communicated to employees to achieve their buy-in and must explicitly reflect the importance that management places on innovation.

The management of high performing companies was visibly and tangibly committed to new product development and explicitly formulated and communicated the firm's new product development strategy Paipa-Galeano, L., Bernal-Torres, C. A., Otálora, L. M. A., Nezhad, Y. J., & González-Blanco, H. A. (2020). To develop an effective financial engineering process, banking management need to focus not only on products, technology and processes, but also on the culture of the organization, its norms, values and beliefs Yusuf, Y., Gunasekaran, A., Papadopoulos, T., Auchterlounie, W., Hollomah, D., & Menhat, M. (2018). There is a need to develop a climate that is conducive to creativity, Newman, A., Round, H., Wang, S., & Mount, M. (2020)., with a strong external focus on multiple stakeholders. The need to understand user needs Dieter, W., & Schmitt, W. (2018) and the importance of culture Olsson, A., B. Paredes, K. M., Johansson, U., Olander Roesse, M., & Ritzén, S. (2019). Arc also was consistent with themes in the literature. The attention of practitioners and academics have for many years been preoccupied with the quality movement in banks, focusing on product and process improvements through an evolutionary incremental process Kariuki, F. W. (2010).

Financial engineering have an impact on banking. That is, innovation in combination with electronic technology is creating a world in which maturity transformation, turning short-term deposits into longterm loans, the central function of banks is unnecessary. Hence, economic agents, individuals, households,

companies, will no longer require this service. Their portfolios of assets and liabilities will be broadly matched in maturity terms; short-term assets will match short-term liabilities; long-term liabilities will offset long-term assets. Regarding the importance of innovation, there are a huge body of knowledge like, technological innovation is a means of survival and growth of industrial sectors or technological innovation is recognized as a major contributor of economic growth and a dominant factor of business success not only in developed countries but also in developing countries (DCs) (Pack & Westphal, 2016; Wilkinson, 2015). Odoom, (2017) suggested that one of the requirements for economic and industrial development of DCs is their ability to innovate successfully. According to Teller (2016), a company must innovate or die. The process of innovation is fundamental to a healthy and viable organization. Those who do not innovate ultimately fail.

Hill and Utterback (2009) identified technological innovation as a major agent of development and change in societies which has been linked to rising productivity, employment growth and a strong position in export markets, trade and improved quality of life. However, the inherent complexity of the process of technological innovation and its involvement in interaction with different environmental as well as industry-specific factors, make studies of the characteristics of technological innovation seem difficult to carry out. However, Lall (2015) stressed that a significant amount of technological innovation is taking place in the modern sectors of DCs, particularly in those with relatively long experience of manufacturing and with broad-based capital good sectors. To Lall (2015) these innovations include changes in broad sense. They encompass increase in productivity and efficiency from simple learning by doing, advances in the designing, constructing and managing complex and advanced industrial processes and a manifestation of the ability to innovate technologies in the areas of medium to high.

### **Relationship between Financial Engineering and Performance of Commercial Banks**

All financial engineering strategies are implemented using a few basic techniques, such as increasing or reducing risk (options, futures and other more exotic derivatives), pooling risk, swapping income streams (interest rate swaps), splitting income streams ('stripped' bonds), and converting longterm obligations into shorter-term ones or vice versa (maturity transformation) Friedrich, J. (2021). But to be truly innovative, a new security or process must enable issuers or investors to accomplish something they could not do previously, in a sense making markets more efficient or complete.

Khraisha, T., & Arthur, K. (2018). describes ten forces that stimulate financial engineering. These include risk management, tax advantages, agency and issuance cost reduction, regulation compliance or evasion, interest and exchange rate changes, technological advances, accounting gimmicks and academic research. Much of the research attention to innovation focuses on the new idea. But at least as important is the adoption and spread of an innovation - its diffusion - across on industry. Indeed, faster diffusion means a higher societal return on the underlying investments in the innovation (Walston , 2020). Innovation strategy is a determinant of company financial performance and provides additional insights into the indirect contribution of the individual dimensions of innovation strategy to company performance. The primary function of the financial system is to facilitate the allocation and deployment of economic resources, both specially and across time, in an uncertain environment Taillon, B. J., & Huhmann, B. A. (2019).

This function, in turn, encompasses a payments system with a medium of exchange; the gathering of savings for pure time transformation (deferral/smoothing of inter-temporal consumption); and the reduction of risk through insurance and diversification. The financial performance of banks and other financial institutions is usually measured using a combination of financial ratios analysis, benchmarking, measuring performance against budget or a mix of these methodologies Ward, M., Forristal, P. D., & McDonnell, K. (2020). The common assumption, which underpins much of the financial performance research and discussion, is that increasing financial performance will lead to improved functions and activities of organizations. The subject of financial performance and research into its measurement is well advanced within finance and management fields. It can be argued that there are three principal factors to improve financial performance for financial institutions; the institution size, its asset management, and the operational efficiency (Bijiker. 2007).

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## Adoption of Financial Engineering and Performance

The appearance of financial engineering in banks has also been influenced by the realization on Wall Street in the early to mid-1990s that there was a need for a new kind of graduate training (Nagy, M., Paulik, É., Kiss M, N., Vereszki-Varga, P., & Ladányi, S. (2019). The financial institutions wanted people with heavy mathematics skills and some finance training, and had previously been fed from a haphazard network of different programs. Commercial banks in Kenya have developed new innovations that have influenced their financial performance. These includes mobile banking technologies, electronic money transfer, internet banking transactions, ATM deposits, and withdrawals, online account opening among others. All these innovations contribute heavily in building customer base, capital base as well as enhancing profitability which results to improved financial performance. One important driver of organizational learning is experience with process technology. Organizational learning might be said to occur as an organization and its members build a knowledge base of action-outcome relationships relevant to its tasks and technologies (Palvalin, M., Vuori, V., & Helander, N. (2018). These knowledge bases have been called technological knowledge (Shaikh, S., & Bhutto, A. (2021). As technological knowledge bases become more complete through learning, knowledge is said to be mature (Palvalin, M., Vuori, V., & Helander, N. 2018). In developing his model of knowledge maturity he focuses on what he calls technological knowledge. Chien, G. C., Mao, I., Nergui, E., & Chang, W. (2020) Showed in their study that most previous studies concerning company performance evaluation focus merely on operational efficiency and operational effectiveness which might directly influence a company's survival. Using an innovative two-stage data envelopment analysis model in their study, the empirical result of this study is that a company with better efficiency does not always mean better effectiveness. A paper entitled 'efficiency, customer service and financing performance among Australian financial institutions' showed that all financial performance measures as interest margin, return on assets, and capital adequacy are positively correlated with customer service quality scores.

As financial engineering attempts to define itself as a field with connections closer to the engineering disciplines than more traditional finance, associations are being set up. And the general engineering community does not quite know what to do (Mirji, A. B. 2013). Recent changes in patent laws and interpretations, along with encouragement for institutions to do more patenting have led to an explosion of new patents. Some of these are in financial engineering but it is not clear which can be defended. Certainly, financial patents will have an impact on the efficiency of markets and the rate of financial innovation (Nyström, M., Jouffray, J. B., Norström, A. V., Crona, B., Søgaaard Jørgensen, P., Carpenter, S. R., ... & Folke, C. (2019).

Yusr, M., Mokhtar, S., Abaid, W., Perumal, S., & Fauzi, F. (2018) define innovation as “something that is new or improvement done by an enterprise to create significantly added value either directly for the enterprise or directly for its customer,” Drotner, K. (2019) refer to innovation as “new products or processes that increase value, including anything from patents and newly developed products to creative uses of information and collective human resource management systems. Literature continually advocates that evaluation is a necessary process to establish whether innovation has been effective in meeting individual and organizational priorities. This enables judgments to be made, about cost effectiveness and to aid organizational learning and improvement. Despite innovation absorbing real and substantial costs, and considering Susanto, A. B., Titisari, P., & Prajitiasari, E. D. (2021) concludes that the clarity of organizational objectives in terms of innovation has led to an increased emphasis on the evaluation of return on investment, Olsson, A., B. Paredes, K. M., Johansson, U., Olander Roese, M., & Ritzén, S. (2019). Observe that systematic evaluation rarely occurs within organizations. Making causal connections between investment in innovation, and future management performance and organization success is externally difficult. Lall (2015) highlights the difficulty in establishing a statistical link between the incidence of innovation and company performance. Similarly, Tidd Bessant and Pavitt (2001) found that the literature tends to focus heavily on training and education, and is primarily concerned with measuring the inputs, process and immediate outcomes rather than the longer-term impact of innovation.

Han. (2013) indicates that some innovations are built on existing products, services, or procedures, and are incremental in nature. Others involve greater degrees of difference and are more radical than incremental.

Some innovators aim to be first, others aim for second place. He adds that a different dimension of innovations is the degree to which they imitate something already familiar. The middle portion of the framework, creativity and ideas management, selection and portfolio management and implementation management, comprises the processes necessary for carrying out or developing an innovation, the process used in carrying out an innovation task requires an understanding of how firms manage the process of developing new products and services. Development includes the process of generating, selecting, and transforming ideas into commercially viable products and services. Several studies suggest that firms with high performance in innovation usually have a formal process for developing new products and services.

This formal process includes creativity and ideas, selection and portfolio, and implementation management. Creativity and ideas management is the stimulation of ideas addressing customer requirements. The scope of ideas should be wide and all employees should be involved and ideas from customers cultivated. Selection and portfolio management provides an efficient means to select from the many ideas generated and choose the best ideas for implementation. Implementation is the fundamental capability to turn new ideas. The human resource management element of the framework deals mainly with people and organization climate issues: the underlying impetus of innovation management is the need to create an environment where employees are motivated to contribute to innovation. An effective human resource policy that supports innovation and encourages the development of an innovative organization is needed. Stamm, M. (2003) Suggest that firms should focus on norms that support creativity and implementation in order to build an innovative culture. Rewarding employees for their innovation effort is one way to build an innovative culture. Studies have confirmed that the type of reward mechanisms best practice firms offer their employees have been based on financial and non-financial rewards.

## Financial Performance

Performance is the outcome of all of the organization's operations and strategies (Wheelen and Hunger, 2002). Measuring financial performance accurately is critical for accounting purposes and remains a central concern for most organizations. Performance measurement systems provide the foundation to develop strategic plans, assess an organization's completion of objectives, and remunerate managers (Kariuki, F. W. (2010). Although assessment of performance in the marketing literature is still very important, it is also complicated (Pont and Shaw, 2003). While consensual measurement of performance promotes scholarly investigations and can clarify managerial decisions, marketers have not been able to find clear, current and reliable measures of performance on which marketing merit could be judged. Two approaches have been adopted in the literature to measure financial performance.

Longer term performance has been chosen for two reasons: firstly because that is what the customers of "retail" products such as unit trusts might be expected to be looking at, particularly in view of the charging arrangements which make shorter term investment unwise. Secondly, one of the attractions of looking at "real" products rather than theoretical studies is the question of how administrative costs contribute to the results. In principle, such costs might appear in either front-end or regular annual management charges. Using five-year bid figures should capture such effects regardless of the choices of individual firms as to how to split costs between the two types of charges. Financial performance is essential to the survival of firms in the competitive and uncertain environment. Management is eager to learn how the effort of service quality improvement is related to an organization's performance (Sousa and Voss, 2002). Financial performance ultimately reflects whether or not service quality is realized in a firm. Financial performance is conceptualized as the extent to which a firm increases sales, profits, and return on equity.

These are indicators of financial performance and manifest the wellbeing of a firm collectively, Measuring Financial Performance Since their inception, companies have used various yardsticks for measuring and reporting financial performance. The two main items used to measure financial performance are the firm's market share within the particular industry in which it operates and its profitability. Profitability is then used to measure the company return on capital employed hence value to its shareholders. Accountants and economists have derived and used various financial ratios to assess company financial performance. These ratios mainly involve the company liquidity cash flow liquidity ratio, debt management - financial leverage index, asset management - return on total assets, profitability cash flow margin and finally return on investment - dividend

yield (Kariuki, F. W. (2010). Traditionally, the financial performance of banks and other financial institutions has been measured using a combination of conventional accounting measures and risk and return measures.

Further analysis of financial performance has used methodologies such as financial ratio analysis, benchmarking, measuring performance against budget or a combination of these (Barnett and Salomon. 2006). Financial statements published usually include a variety of financial ratios designed to give an indication of the institution's performance. As with any method of analysis designed to measure financial performance, there are limitations and imperfections associated with the use of financial ratios, particularly the use of very few ratios in isolation (Pont and Shaw, 2003). Simply stated, much of the current bank performance literature describes the objective of financial institutions as that of earning acceptable returns and minimizing the risks taken to earn this return (Pont and Shaw, 2003). There is a generally accepted relationship between risk and return that is the higher the risk the higher the expected return. Therefore, traditional measures of bank performance have measured both risks and returns (Swanson, 2013).

## Different Theories

Theories are formulated to explain, predict and understand phenomena and, in many cases, challenge and extend existing knowledge within the limits of critical bounding assumptions (Swanson, 2013). The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists (Swanson, 2013). A theoretical framework is a collection of interrelated concepts like a theory but not necessary so well worked out. A theoretical framework guides the research, determining what are to be measured and what statistical relationships are to be looked out for (Swanson, 2013). A theoretical framework is used to limit the scope of the relevant data by focusing on specific variables and defining the specific viewpoint that the researcher will take in analyzing and interpreting the data gathered. It also facilitates the understanding of concepts and variables according to giving definitions and builds new knowledge by validating or challenging theoretical assumptions (Swanson, 2013). The theoretical framework for this study covers the specificity of financial engineering for project finance. It also takes into consideration the impact of financial engineering on building project finance in the banking sector. In order to arrive at these conclusions, the study is guided by the innovator's solution, innovator dilemma theory of innovation and disruptive innovation theories. These theories are discussed in the ensuing sections

## Innovator's Solution Theory

Financial innovation over the past two decades has rapidly brought about revolutionary changes in financial instruments and processes. Almost daily the financial press carries yet another tombstone advertisement featuring a new security. A variety of factors, among the more important of which are increased interest rate volatility and the frequency of tax and regulatory changes, have stimulated the process of financial innovation. The deregulation of the financial services industry and increased competition within investment banking have undoubtedly placed increased emphasis on being able to design new products, develop better processes, and implement more effective solutions to increasingly complex financial problems. The theory of the innovator's solution is a brilliant analysis of why companies fail to innovate. It explains convincingly why corporate managements do not learn about good ideas, and why managers succumb to inherent pressures to run away from the challenge of disruptive competition rather than stand and fight.

The decisions made as a result of these pressures make sense in the short run to the individuals involved, but in due course they send the organization into an inexorable death spiral (Kim, H. C. (2015). But while their analysis of the causes of failure to undertake disruptive innovation is effective, their proposal for solving the dilemma of disruptive innovation is less helpful. The central premise of their theory, the innovator's solution, is to accept the grim reality that big companies are inherently and constitutionally disinclined to tackle disruptive innovation. A modern organization will crush disruptive new ideas, because they represent a threat to management, to careers, to power structures, to customary ways of things, to client bases, to brands, to corporate culture. The authors' solution is to protect genuine innovators and their disruptive change ideas from these hostile forces.



According to Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. (2018), the originator of this theory, corporate leaders should put up a wall between the innovation and the existing hierarchy. Leadership should create an independent business unit, which will provide a safe and protected environment for innovation. There, the innovation can flourish without having to light off the interferences and intrusions and anti-innovation attitudes of the hierarchy.

Allowing a different culture to flourish in a separate organization eventually leads to repeated power struggles and culture clashes, which members of the mainstream organization invariably win. Interest in the new ventures tends to be cyclical. Brief surges of enthusiasm, triggered by abundant resources and the desire to diversify, are followed by sharp declines. The life spans of both internal venture units and corporate venture capital funds, therefore, tend to be short, on average, only four to five years. Christensen and McDonald innovator's solution theory rests on the hope that if one can build enough commercial success in the marketplace, he/she has a better chance of eventually winning that battle of persuasion. Surely, their argument goes, the hard numbers will win the war. Unfortunately the track record shows that even with strong commercial success, numbers and reason are not enough to dislodge the forces of stasis and inertia. Financial engineering is the lifeblood of this activity. Financial engineering involves the design, the development, and the implementation of innovative financial instruments and processes, and the formulation of creative solutions to problems in finance. The term "innovative" is used here to describe a solution that is nontrivial. Innovative financial solutions may involve a new consumer-type financial instrument, such as IRA and Keogh accounts; a new security, such as money market preferred stock; a new process, such as the shelf registration process; or a creative solution to a corporate finance problem, such as the design of customized security arrangements for a project financing or a leveraged buyout.

The first security innovation involves the development of innovative financial instruments, including those developed primarily for consumer-type applications such as new types of bank accounts new forms of mutual funds, new types of life insurance products, and new forms of residential mortgages. Innovative financial instruments also include those developed primarily for corporate finance applications such as new debt instruments options, futures, and other new risk management vehicles; new types of preferred stock; new forms of convertible securities and new types of common equity instruments. The second branch of corporate financial engineering involves the development of innovative financial processes. These new processes reduce the cost of effecting financial transactions, and are generally the result of legislative or regulatory changes (for example, the shelf registration process), or of technological developments (electronic security trading). The third branch involves creative solutions to corporate finance problems. It encompasses innovative cash management strategies, innovative debt management strategies, and customized corporate financing structures such as those involved in various forms of asset-based financing

### **Innovator's Dilemma Theory of Innovation**

The innovator's dilemma theory was proposed by Christensen in 2003. The crux of Christensen's (2003) insight is that firms wishing to innovate face an irresolvable dilemma: their existing customers will encourage them to focus resources on building a better widget; while somewhere else another company is building a gadget, either for new sub-segments of the market, or for an altogether new market. The technological trajectory of the gadget, however, will lead it to eventually usurp the position of widgets in the whole marketplace by destroying the widget market altogether. Therefore, widget companies that listen closely to their existing customers and perfect their technology will one day inevitably face a situation where the market for their technology has been made redundant by the market for the next-best-thing: the gadget. Those feckless existing customers will then defect to gadgets, leaving widget producers high and dry.

The story thus told may be captured in the following relationship and its consequences for firm strategy: The better aligned management incentives are to serving the existing customer base by improving the current technology of the firm, the more likely the incumbent firm is to be blindsided by a market for a fresh new technology created by a challenger entrepreneurial firm. This fresh new technology initially appeals only to customer markets that do not appeal to the firm, but goes on to capture the firm's core customer base over time. Ergo, a well-meaning management team just cannot win by doing the right thing. Analytically, this dilemma was explained by Christensen as having three key elements: The first is that there is a

strategically important distinction between sustaining technologies and those that are disruptive. Second, the pace of technological progress can and often does, outstrip what markets need. This means that the relevance and competitiveness of different technological approaches can change with respect to different markets over time. And third, customers and financial structures of successful companies color the sorts of investments that appear to be attractive to them, relative to certain types of entering firms (Christensen, 2003). While having its share of admirers and detractors, Christensen's framework has certainly heightened practitioner awareness of the basic phenomenon of creative destruction described by Schumpeter, i.e., the market chum is a fundamental feature of competition and the evolution of economic systems. The dilemma this situation appears to pose for incumbent firms is also a "perennial" issue in research on the economics of innovation, technology evolution, firm strategy, marketing and entrepreneurship. This means that potentially relevant literature is enormous. So in our review of the literature below, the review is restricted to summarizing three central issues that have historical staples, plus an overview of current conversation.

First, the economic incentives for incumbent firms to engage in uncertain innovative activities have been examined in detail in the literature on the economics of technological innovation and firm strategy (Archibugi, Filippetti, & Frenz, 2013). The central proposition of this research is that incumbent firms will experience disincentives to create new technologies that disrupt existing technologies because the new technology cannibalizes the rent stream from the old. Non-incumbent challengers do not face this disincentive. So they rationally invest more and as a result will contribute a disproportionately large share of major innovations (Archibugi, Filippetti, & Frenz, 2013). Thus, incumbents face the unsavory prospect of having to decide when to start cannibalizing themselves in the full knowledge that much uncertainty pervades this choice. If they listen to their existing customers too much and stay with them too long they face being disrupted by an entrepreneurial attacker; if they listen inadequately to their existing customers and migrate to a new technology too early then they lose the rent stream from the old product.

Second, the marketing literature has focused on a central and unsettling suggestion made by Christensen (2003), that the innovator's dilemma consists in the fact that by doing the right thing (i.e. listening to current customers) leading firms often end up losing their markets to upstart newcomers. This is unsettling because compelling evidence exists in the marketing literature that market orientation leads to positive business performance (Akiike, A., & Iwao, S. 2015). The essence of this debate suggests a trade-off between two fundamental functions of good management: the creation of satisfied customers and the creation of innovations.

Third, organizational researchers have been concerned with the questions that the innovator's dilemma poses for organizational change, in particular the problem that disruptive technologies pose for organizational capabilities (Henderson, 2014). The essence of this problem is very well understood in the literature on organizational learning: it is an example of organizations having to cope with the difficulties inherent in trading-off the exploitation of existing technologies, capabilities and markets with the exploration for new technologies, capabilities and markets. This trade-off is considered as the relationship between exploration of new possibilities and exploitation of old certainties (Tamayo-Torres, Gutierrez-Gutierrez, & Ruiz-Moreno, 2014) Firms balance exploration with exploitation by trading-off the costs of exploration (investments in survival) with the benefits of exploitation (maximizing returns to investors). Contingency theorists take issue with the assumption that the search is for best practice, and instead seek to identify sets of variables which will make appropriate, a particular type of management development strategy, from a repertoire of possibilities. Climate mainly influences organizational structure appropriate pattern.

### **Disruptive Innovation Theory**

Disruptive innovation theory was hypothesized by Christensen. He suggested that in a quickly changing and uncertain world, innovation is the key to competitive advantage. Yet innovation also increases uncertainty and market pressure. The more radical the innovation, the more difficult it is to estimate its market acceptance and potential. The increasing complexity and market dynamics create a substantial knowledge gap between theory and practice. Many companies are not organized to give new ideas a chance, to recognize trend breaking points in the market, to adapt quickly to changing market circumstances, or to cause

market changes in the first place. Disruptive innovations change the game. They attack an existing business, and offer great opportunities for new profit growth. Only radical innovations lead to growth. Innovation is a successfully exploited product, service or business model that significantly transforms the demand and needs of an existing market and disrupts its former key players. A radical innovation is a product, process or service with either unprecedented performance features or familiar features that offer significant improvements in performance or cost that transform existing markets or create new ones.

Breakthrough innovations are based on inventions that serve as a source of many subsequent inventions. Ambiguous, extremely turbulent and uncertain times, combined with a long development time, make breakthrough innovations a highly risky matter. Disruptive innovation frequently results from a combination of the emergent qualities of several smaller ideas based on observing the world differently, challenging presuppositions, expanding boundaries, spotting the “white space”, discovering the as yet unrealized needs of customers, setting challenging targets, thinking the unthinkable and challenging our underlying mental models. Innovation patterns appear as fractals, with small decision cycles imbedded in larger decision cycles in which the basic development steps (identify develop plan- implement) are the guiding principle. Within this basic outline, the process of disruptive innovation is a rhythm of searching and selecting, exploring and experimenting, of learning and unlearning, and cycles of divergent and convergent thinking. It is a complex and interactive process of probing and learning or feedback. Contrary to linear, incremental innovation processes, such as the stage-gate concepts (Kahn, K. B. (2018). disruptive innovation is more like a spiral or circular development process of continuous fast feed-forward and feed-back loops. This process is affected by exogenous determinants such as economic, social and political factors, competition and infrastructure, and endogenous determinants such as resources, corporate structure and corporate culture.

## **Technological Innovations**

One of the consequences of the development of computer and financial technologies is the incredible growth in electronic trading. This has both good and bad implications for ordinary investors. On the positive side, the tools developed by cutting edge financial institutions over the last two decades are now available to the individual household. Although trading costs have come down dramatically for the individual investor, the possibility of doing serious damage to your nest egg is even greater. Mashalla, Y. J. (2014). claim that innovation requires a process of co-evolution between technology and cultural perspectives, technology exerts a significant influence on the ability to innovate and is viewed both as a major source of competitive advantage and of new product innovation (Gunasekaran et al.,2019; Johnson, A. (2001). Often, banks experience problems in this area, which are caused by lack of capital expenditure on technology and insufficient expertise to use the technology to its maximum effectiveness (Alstrup, 2000). If management skills and activities are conceptualized to be situation specific and embedded in the organizations in which they are practiced then the question arises about what is the best way to prepare managers for the “complexity, uncertainty, uniqueness and value conflicts” which Margerison, C. (2005) postulates characterize organizational environments. A number of issues merit attention when discussing management development strategies, Management development is now viewed as one of the key organizational processes aimed at delivering successful organizational adaptation and renewal.

However, Doyle (2014) cautions that success will only occur if management development strategies are adapted and implemented in ways that are congruent with the changing needs and expectations of the new organizations. It is critical for management development literature for propounding “universal nostrums” without “due regard for context” because it is context which shapes and influences the way development are formulated and enacted. Margerison, C. (2005) cautions that management development may fail if there is no clear policy statement. Doyle (2014) lists a number of guidelines when preparing such a policy. These guidelines generally emphasize a holistic approach which links to the reality of what managers do; take cognizance of required competencies and characteristics; consider organizational culture and context; focus on linkages with business strategies and policies; and map out the cultural philosophy of management. The policy should also ensure flexibility so that both organizational and individual needs can be accommodated. Nowak, W. A (2018) classified three approaches to management development which similarly have significant

implications for management development strategy and which reflect particular sets of organizational contingencies. Management development can be conceptualized as progression through different levels of maturity, a progression that can only take place in the context of a holistic approach to management development in 27 which both “hard” and “soft” managerial issues are considered in framing the right strategy. A systems perspective, as advocated by Doyle (2014) views management development in terms of an integral part of a wider organizational system, and linked to the context and reality of managerial work. A systems perspective reveals the synthesizing, relational and integrative qualities and fosters an awareness of the complex interactions and patterns of causal relationships that exist both internally and external to the conceptualization (Nowak, W. A. (2018)). Such a perspective leads to the conclusion that management development is at one and the same time both a system and a process, and as an open system, it interacts dynamically with variables from other environmental and organizational subsystems, activities and processes.

A systems perspective leads to the development of a broader set of strategies, policies and plans; it permits the notion of conceptualize development through management development; it encourages productivity and responsiveness; it leads to a better assessment of performance and overall program effectiveness; and it contributes to the creation of a positive learning culture enabling the encompassing of generative learning. In framing management development within a more holistic perspective, systems thinking extends its context beyond the rational-functional to include qualitative dimensions, and produces new insights which themselves challenge some of the fundamental assumptions on which existing conceptions of management development activity and strategy are premised. 28 Management developments are perhaps best conceptualized as an open system consisting of an assemblage of interrelated elements directed towards common goals (Doyle, 2014). The process is then neither fragmented nor piecemeal, but integrated, congruent and supportive of organizational goals (Zhuge, L., Freeman, R. B., & Higgins, M. T. (2020)). Inherent in a systems model is the existence of a coherent and supportive infrastructure, with management recruitment, selection, reward and promotion considerations all feature as core inputs. Zhuge, L., Freeman, R. B., & Higgins, M. T. (2020) advocates a unified approach to management development which sees it located at the very heart of the organization’s philosophy, mission, business goals, and HR strategy, in a process that is coherent and integrated across all functions and hierarchies, so that effective management of the enterprise and development of managerial talent are a single integrated activity.

**Product Innovation:** Product innovations provide the most obvious means for generating revenues. Process innovation, on the other hand, provides the means for safeguarding and improving quality and also for saving costs. Improved and radically changed products are regarded as particularly important for long-term business growth (Vermeulen, p 2004). The power of Product innovation in helping companies retain and grow competitive position is indisputable. Products have to be updated and completely renewed for retaining strong market presence. Different terminologies have been used to categorize and describe product development. Kavadias, S., & Ulrich, K. T. (2020), for example, embraces two distinct activities: old product development, which involves updating and improving existing products, and new product 29 developments, which involves a greater degree of innovational challenge. Kavadias, S., & Ulrich, K. T. (2020) similarly categorized product development into primary and secondary innovations. Primary innovations were broadly concerned with the development of new markets and relate to instances with a high degree of technical originality and a commensurate change in consumer behaviour.

Secondary innovations, on the other hand, are basically business or company focused and typically involve improvements to an existing market. Product portfolio decisions are the manifestation of a firm’s innovation and marketing strategies. The common approach to managing new product development is to develop and manage a portfolio of specific projects (Kavadias, S., & Ulrich, K. T. (2020)). Practically speaking, choosing the product portfolio determines the firm’s strategy for the medium term future and is senior management responsibility (Beltagui, A. (2018)). Operationally, portfolio decisions involve two strategic components: a development strategy regarding the number and rate of new’ product introductions (introduction intensity), and a market entry strategy regarding the relative speed to market (pioneering intensity). Past research suggests that better-managed firms structure their portfolios by striking a balance in the product innovation portfolio across these strategic components. However, past research has not systematically decomposed the components of portfolio strategy to examine how components work together in relation to financial performance. Market

Innovations Counterpoints to financial engineering include traditional market efficiency arguments against active management, such as Bill Sharpe's arithmetic. Even if it is possible to beat the market, and notwithstanding the fact that past performance should not be the sole criterion for judging investment managers, the riskiness of active strategies can be very different from passive strategies. Such risks do not necessarily average out over time, and investors' risk tolerance should be part of the process of selecting an investment strategy to match their goals.

Market innovation is concerned with improving the mix of target markets and how chosen markets are best served (Matthyssens, P. (2019). Its purpose is to identify better (new) potential markets; and better (new) ways to serve target markets. Market segmentation, which involves dividing a total potential market into smaller more manageable parts, is critically important if the aim is to develop the profitability of a business to the full. Incomplete market segmentation will result in a less than optimal mix of target markets, meaning that revenues, which might have been earned, are misread (Morgan, N. A., & Vorhies, D. W. (2018). Market orientation is a business culture that leads to business performance improvement, as proved by numerous studies (Morgan, N. A., & Vorhies, D. W. (2018). It is precisely product innovation that is considered as a moderator of the link between market orientation and successful business operation (Morgan, N. A., & Vorhies, D. W. (2018). Innovations have a positive impact on business performance by leading to a market share increase and/or cost reduction and, in turn, a profit rise. Market oriented enterprises deliver superior quality products to their 31 customers while complying with ecological, health and safety standards as well as with legal norms. Accordingly, market orientation is expected to produce a significant positive impact on all analyzed effects of innovative activities. Sales has been proposed as the most important measure of business performance on which managers should focus (McAdam and McClelland; 2002), and is a measure of firm performance that is often closely associated with the marketing function. Similarly, gross profit (sales revenue minus cost of selling) is an indicator of the firm's value chain, specifically measuring a firm's ability to convert inputs into valuable outputs (McAdam and McClelland; 2002). The market in which an enterprise offers its products can be a predictor of the effects of innovative activities.

Strengths and weaknesses of competitors, demands raised by consumers, legal regulations, as well as ecological, health and other standards, motivate enterprises to develop products taking into account the situation in a particular market. Enterprises often find themselves having to modify their products sold on the international market, not only to achieve outstanding business performance and competitive advantage, but also to enter the market in the first place and to remain in it accordingly; the market range can have an impact on the effects of innovative activities. It is to be expected that the more present an enterprise is in the international market, the more oriented its innovation activities are towards improving product quality, ecological and health aspects, as well as towards complying with legal standards and various regulations.

## Empirical Review

The Companies Act, the Banking Act, the Central Bank of Ghana Act and the various prudential guidelines issued by the Central Bank of Ghana, govern the Banking industry in Ghana. The banking sector was liberalized in 1995 and exchange controls lifted. The Central Bank of Ghana, which falls under the Minister for Finance's docket, is responsible for formulating and implementing monetary policy and fostering the liquidity, solvency and proper functioning of the financial system. The Central Bank of Ghana publishes information on Ghana's commercial banks and non-banking financial institutions, interest rates and other publications and guidelines. Banks in Ghana have come together under the Ghana Bankers Association (GBA). Which serve as a lobby for the banks' interests and addresses issues affecting its members? There are forty-six banks and non-bank financial institutions, fifteen micro finance institutions and forty-eight foreign exchange bureaus in Ghana. Thirty-five of the banks, most of which are small to medium sized, are locally owned. The industry is dominated by a few large banks most of which are foreign-owned. Six of the major banks are listed on the Ghana Stock Exchange. Commercial banks and non-banking financial institutions offer corporate and retail banking services but a small number, mainly comprising the larger banks, offer other services including investment banking.

The Ghanaian Banking sector has demonstrated a solid growth over the past few years; the industry continues to offer significant profit opportunities for the major participants. Banks generally carry their revenues from

taking in funds and lending them out at a higher rate. The interest spread between deposits and loans continued to be between 9 and 10% in 2009, offering much profit potential. Profit after tax of the overall banking system increased by 14.5 % or 4.37 billion, from 30.15 billion in December 2008 to 34.52 billion in December 2009. This growth is a continuation of the strong growth in profit after taxes that the industry has achieved for the past several years. The increase in profit reflected an increase in interest income on loans and advances, which rose by 21.3% or KShs 16 billion to KShs 91.2 billion in December 2009 from 75.2 billion in December 2008. The increase in interest income was due to the growth of 14.33% in loans issued. The average commercial bank monthly average rates remained high, moving between 14.67% and 15.09% in 2009.

Internationally, research on financial engineering forms a huge body of research focused on problems of technology-based change in organizational and social settings. The popularity of the financial engineering in financial performance research testifies to its usefulness. Furthermore, it has been recognized that the innovation process in companies basically consists of the development of new routines (Nieto, 2004). The financial engineering process has also been associated with the creation of core competencies and with the development of dynamic capabilities. Kihumba (2008) conducted a study on the determinants of financial innovation and its effects on banks performance in Kenya. This study concluded that technological innovations influence the structural aspects of banks in Kenya particularly on financial innovation as a strategy.

Odhiambo (2008) in an investigation on innovation strategies at the Standard Chartered Bank found that innovations were used in coordination and input of key departments and individuals; adequate resources and well trained personnel are also necessary for the strategy to be successful. He recommended that the innovations should incorporate the low-level employees since they are better placed to understand the needs of consumers. He also found that there is poor coordination between the key departments and individuals, very few resources are allocated for research and development on the processes involved, there are high rates of skills mismatch and top-management takes a dictatorial role in carrying out the process. Use of various aspects of innovations is thus expected to have great effects on the financial performance of an organization. This study looks into the impact of financial engineering on the financial performance of commercial banks.

Further, the role of monetary policy, in response to inflation also impacts project financials and bank lending. The impact of inflation, as analyzed by Visconti (2012), occurs through the relative impact on the weighted average cost of capital (WACC) and the net present value (NPV). Given this, increases in the inflation rate unambiguously increases the denominator in the NPV equation, and thus reduces the NPV itself and increases the cost of debt (as bank debt is floating and indexed to inflation) and, therefore, increases WACC. Thus, very real scenarios arise that with higher inflation; the WACC may exceed NPV and could result in equity as well as cash burnout.

Analyzing a broad range of potential factors on determinants of bank credit, Pham (2015) uses data on 146 countries over 1990–2013. The results suggest that the key factors restricting credit supply include nonperforming assets, capital requirements, and bank concentration. However, the results do not find any evidence on the impact of return on equity/return on assets (ROE/ROA) on bank credit supply. In a related paper, Mirzaei and Mirzaei (2011) determine that factors such as cost to income ratio and capital ratio are the key determinants of profitability, suggesting that higher levels of capitalization reduce funding costs for banks. A key finding of the study is the significant negative relationship between profitability and the net loans to deposits and short-term funds ratio. This indicates that lending by banks based on short-term deposits negatively impacts bank profitability.

Kirti (2017) suggests that the banks' liability structure drives the interest rate exposure of assets, implying that banks with more floating rate liabilities make more floating rate loans. The results establish an important link between the intermediaries' funding structure and the types of contracts used by nonfinancial forms. The author shows that banks achieve this by passing on interest rate risk to firms. Two other researches advance related arguments. Ivashina, Scharfstein, and Stein (2015) argue that hedging frictions make it advantageous for banks to lend in the same currency as their deposit financing. Hanson et al. (2015) argue that the types of assets intermediaries hold depend on the stability of their funding. More broadly, Kirti (2017) is also connected with

the view that there are synergies between deposits and commitments. Funding a project by either the private or public sector requires a financial evaluation and there are various approaches used when engineering the financing of a project, some of these are discussed below.

Gerardin (2016) identifies the public sector's financial evaluation methods as being based on a cost benefit or cost effectiveness philosophy; taking externalities into account such as the wider impact of the project on the community and environment. The private sector on the other hand evaluates projects on the basis of the ability of the cash flow to cover debt service, operating costs and capital repayments, and of course the all-important internal rate of return (IRR). Although the borrowing costs of government are lower than private borrowing: there could be a 20-40% difference (Muranyi, 2017), follow-up costs must be considered when deciding to make the investment. Schmidt (2015) report that a study conducted in the Federal Republic of Germany shows that follow-up costs of public investments, such as maintenance costs, could amount to more than 30% of the investment cost every year. These are some of the issues that must be considered when the choice of finance for a project is to be made. The researcher feels that the increasing complexity of financing structures and arrangements now invented for projects causes a blurring of the boundaries between these categories. In this section no attempt is made to categorize the mechanisms.

Participants in project financing are expanding their level of expertise and involvement, and with new entrants to the field, the mechanisms are getting more complex, yet more efficient. With increasing demand for more privately financed projects and the application of project financing across sectors, there is increasing specializing by providers enabling the development of more efficient tools for private finance. The following sections explore the merits and demerits of the existing providers of finance for project financing. Commercial banks to date provide the bulk of funds that are used to finance privately financed projects. The main feature of banks is that they place themselves between the lender and the borrower by obtaining funds from their investors and lending them to the borrower at higher rates of interest. This is in contrast to the capital markets, where the markets enable funds to be moved from regions of surplus, to deficit regions without the involvement of banks as intermediaries (Marsh & Wild, 2017).

According to Lewis and Davis (2017) the activity of banks can be categorized into three classes, in the relation to the currency used and the location: Domestic Banking. This generally includes the transactions between banks based in the same country and in that country's currency. Transactions of non-residents may also be classed as domestic when the transactions are in the currency of the country of residence. International Banking refers to the cross currency and cross border activities of banking where deposits are taken from nonresidents (foreigners) or the banks lend to foreigners in the banks' domestic currency. Eurocurrency banking falls under international banking and is the borrowing or lending in currencies other than the domestic currency of the country in which the bank is located. These transactions normally involve large sums of money and the main currency involved is the US Dollar, hence the term 'Eurodollar'.

Multinational banking involves banking transactions across a large number of countries and geographic regions (Robinson, 2016). Commercial banks, whilst prohibited from taking equity positions, act as project finance lenders in order to acquire assets for their own portfolios. Through the use of warrants, or conversion features attached to debt, banks can sometimes obtain 'equity-like' positions, which yield higher returns than straight debt. Commercial banks may also act as intermediaries in project finance, generating fees by providing financial advisory services or underwriting debt issues. For developing countries, commercial banks remain the largest source of private finance for infrastructure development. There are limitations to project financing through commercial banks such as bank exposure limits, and the mismatch between the short-term maturities sought by banks and the longer-term loans required by infrastructure projects. The exposure limits can be overcome by syndication however this may involve cumbersome procedures. Bank financing may therefore have to form part of a mix with other long term lending or may have to be accompanied by suitable refinancing arrangements (Ahluwalia, 2017). Getting the mix of lending right is significant as it affects the relationship between the promoter and the creditors. This view is supported by Williamson (2017), who states "as the exposure to risk increases debt holders become more concerned with the details of the firms operating decisions and strategic plans. With high debt-equity ratios the creditors become more like shareholders and greater consultation between the management and its major creditors results."

It is therefore essential to acknowledge that in terms of capital at risk, the lender who lends on a non-recourse or limited recourse basis is the major stakeholder in the project and may resemble controlling shareholders (Hass 2017). There is then an apparent breakdown in distinction between debt providers and equity holders. This blurring of the debt and equity is symptomatic of current financial development and the creation of hybrid financial instruments, which incorporate elements of both (Allen, 2016). In developing countries, development needs, are often unable to be met by the government budget and therefore external sources are looked to for finance. Development banks or agencies are examples of such sources and provide extensive funding for development projects. Allen (2016) defines development projects as a discrete package of investments, policies, and institutional and other actions, designed to achieve specific objectives (or set of objectives) within a designated period. In Ghana, several banks have been formed and well capitalized to provide specialized services to businesses and individuals. Most of these banks have minimal capitalization of Ghs400 million. For example, the Agricultural Development Bank is specialized at giving financial assistance to agricultural businesses and farmers. However, most of these banks have standard operating protocols which make innovative financing a huge challenge to businesses and individuals who sought the assistance of these banks.

## RESEARCH METHODOLOGY

### Research Design

In order to answer the research problem, it is of paramount essence to technically disentangle relationship between or among variables in a situation and analyze the relationship devoid of external influences (Nenty, 2009). Consequently, Nenty (2009) opines that research design involves the procedures through which we can explore and analyze the relationship among the variables involved in our problem and consequently to argue the preference of particular procedures over others. Thus research design is a master plan that shows how the research is to be conducted. However, this research adopts a questionnaire survey in an attempt to examine the innovative financing approaches to road construction delivery. The only available way of getting the current picture of a group, profession, organization, etc. is a survey. Consequently, Ayyash et al. (2011) argues that survey helps to provide trends in the population. In addition, survey questionnaire has been identified to be less expensive and not time consuming to conduct (Ayyash et al., 2011).

The explanation to the direction of the researcher towards the conduct of research is very imperative (Baiden, 2006). Bryman (2012) defines research strategy as the enquiry of research objectives. Accordingly, Baiden (2006) asserted that, the three main types of research strategies are quantitative, qualitative, and triangulation. However, the choice to adapt any particular strategy depends on the purpose of the study, the type, as well as availability of information for the research (Baiden, 2006). Hence, this research adapts a quantitative strategy.

### Research Methods

Researchers around the world have employed two main research approaches, namely the quantitative and the qualitative research methods (Adams et al., 2007). The qualitative method presents a descriptive and non-numerical approach to collect the information in order to present understanding of the phenomenon (Berg 2020). Adams et al., (2007) argue that qualitative method employs methods of data collection and analysis that are non-quantitative, aims towards the exploration of social relations, and describes reality as experienced by the respondents. Babbie (2020) points out that qualitative method is an active and flexible method that can study subtle nuances in the attitudes and behaviours for investigating the social processes over time. On the other hand, Adams et al., (2007); and Bryman (2012) point that the quantitative approach uses different types of statistical analysis and provides stronger forms of measurement, reliability and ability to generalize. Quantitative approaches refer to the research that is based on the methodology principles of positivism and neo-positivism and adheres to the standards of a strict research design developed prior to the actual research (Adam et al., 2007).

Moreover, Berg (2004) argues that the quantitative method can deal with longer time periods with larger number of samples leading increasing the generalization capacity.



However some researchers found that the qualitative approach suffers from a number of problems. First, it uses and selects a small sample which will not represent the entire population. Second, transparency and reliability are still low in qualitative methods (Berg, 2004). Finally qualitative methods are time consuming; it may result in inefficient tools to get adequate explanations (Berg, 2004). Quantitative research design is used in this study. The quantitative method of data collection was adopted because of the availability of data, convenience as well as the nature of the research design which required past and documented facts as basis for performance evaluation.

The justification for adopting a quantitative method in this study stems from three plausible reasons (i) the fact that existing theories make it easier to formulate hypotheses that can be tested using statistical tools; (ii) provides a framework for addressing the relationship among variables in the study; and (iii) useful for dealing a cause and effect relationship. Furthermore, this study applied deductive positivism approach whereby the pre-existing theoretical basis is identified and relied upon in developing the hypotheses, the empirical findings demonstrate whether the tested hypotheses are accepted or rejected. To achieve this objective, this study used the multiple regression as the main tool of analysis in which the researcher pursued the positivist understanding of the conduct of methodological processes that is “unaffected by the individual perceptual differences (Ardalan, 2012). Hair, (2009) stated that “the appropriate method of analysis when the research problem involves a single metric variable presumed to be related to two or more independent variables”. Therefore multiple regression analysis is chosen as the main tool of analysis in this study. Multiple regression models is one of the most common methods of analysis that have been used by previous researchers (Cheng, E. W. (2001).

### **Population, Sampling and Sampling Technique**

Population in research methodology is understood to be objects, subjects, phenomena, cases, events or activities specified for the purpose of sampling (Bayat, M. S. (2008). Consequently, this research focused on the banking industry with spotlight on banks listed on Ghana Stock Exchange with operations in the Accra Metropolitan Assembly only. The population in this study was the management and staff in the banking industry, commercial, universal and investment banks. Sample refers to using a part to represent a whole. Notwithstanding, owing to the nature and kind of information needed; and also the resources available for this research, surveying the entire banking sector is not feasible. Accordingly, only banks listed on the Ghana Stock Exchange were targeted.

Purposive sampling was used to select the sample within the population. Purposive sampling is a sampling technique whereby the researcher decides who to be engaged in the research. This was selected because it allows information-rich issues that are important to the study to be added and also focus on specifics rather than general (Tuuli et al., 2007). The choice was based on bankers experience with financial engineering, specifically those in large commercial projects funding with relative experience in building projects financing. It is considered that people with such knowledge shall contribute immensely to the problem at hand.

### **Sources of Data and Data Collection**

Both primary (questionnaire) and secondary (audited financial records) data were employed for the study. The data were collected to cover every aspect of the research. Neville (2007) argued that research should contain empirical research data. Thus primary data are indispensable in the conduct of any research endeavour. The primary data sources in this research included the population aforementioned. Data were collected through a questionnaire survey targeting bankers. The response structure on the questionnaire was basically close-ended questions. Closed-ended questions were adopted because of its simplicity and ease in analysis. The questionnaire was divided into four thematic areas consistent with the research objectives. The secondary data (financial records) was collected from 2009 to 2019. Data on return on asset (ROA) was gleaned from the financial records of the selected banks listed on the Ghana Stock Exchange.

## Descriptive Statistics

Descriptive statistics have been widely used in academic research (Abdullah 2004). Descriptive statistics measure central tendency and dispersion. The most commonly used measures of central tendency are mean, mode and median. The mean is the most important measure of central tendency (Veal, 2017). The descriptive statistics used were the mean, maximum and minimum. The mean was calculated to measure the central tendency of the variables in 2009 and 2019. Descriptive statistics are also useful to make general observations about data collected. They report on the trends and patterns of data and provide the basis for comparisons between variables. In this study, descriptive statistics provided a comparison of changes in the data for 2009 and 2019. They show the extent to which financial engineering influence and the trends of banks performance.

## Regression Analysis

In analyzing the relationship between financial engineering and building project finance in Ghana, the panel data methodology was adopted. The use of panel data regression methodology in this study is based on three fundamental justifications (i) The data collected had time and cross sectional attributes and this will enable us to study bank financial performance over time (time series) as well as across the sampled banks (cross-section). (ii) Panel data regression provide better results since it increases sample size and reduces the problem of degree of freedom. (iii) The use of panel data would avoid the problem of multicollinearity, aggregation bias and endogeneity problems (Hsiao, 2005). Panel data analysis is an important method of longitudinal data analysis because it allows for a number of regression analyses in both spatial (units) and temporal (time) dimensions. Especially since the technique incorporates both cross-sectional and time-series data, it gives more insightful results with greater variation, less collinearity and a higher degree of freedom (Hsiao, 2005). Besides, panel regression is a potent tool for identifying and evaluating results that cannot usually be obtained in mere cross-sectional or time-series analyses.

The regression model is presented as follows:

$$Y_i = \beta_0 + \beta_i X_i + \varepsilon_i$$

Where:  $i = 1, \dots, n$  = the cross-sectional unit  $t = 1, \dots, T$  = time index  $Y_{it}$  = dependent variable  $\alpha$  = constant or intercept.

$B_0$  = parameters/estimators or coefficients (if estimated)  $X$  = independent variables  $\varepsilon$  = individual (firm)-specific (fixed) effect.

The following empirical models were estimated based on the generic panel regression model to examine the relationship financial engineering and building projects profits of commercial banks:

$$ROE_{it} = \beta_0 + \beta_1 PPE + \beta_2 FININST + \beta_3 MARINOV + \beta_4 PROSTR + \varepsilon \dots \dots \dots .1$$

$$ROA_{it} = \beta_0 + \beta_1 PPE + \beta_2 FININST + \beta_3 MARINOV + \beta_4 PROSTR + \varepsilon \dots \dots \dots .2$$

## Model Diagnostic Test

Before arriving at the appropriate empirical model for testing the hypotheses, some model diagnostic tests were conducted to determine whether any of the assumptions of the panel regression model were not violated. Among the tests conducted were the Correlation test and multicollinearity test. The following are descriptions of the various model diagnostic tests conducted.

## Correlation Test

The study adopted the Pearson correlation matrix to establish the existence of multicollinearity among the independent variables. In order to reduce the effect of outliers and to ensure a normal distribution of the data, a

test for normality was conducted. In this study, the Skewness and Kurtosis test was conducted on the data to ascertain its normality. As a guideline, normal data are assumed to have skewness and kurtosis values near 0. Therefore, if the values are not near zero, then the data cannot be said to be distributed normally. For example, in Field (2009), the value of skewness (asymmetry) and kurtosis should be zero or close to zero if data normality is to be determined using skewness and kurtosis. He argues that once the value for skewness is greater than 1.96 and for kurtosis is greater than 3.29, it means that the data is not normally distributed.

### **Multicollinearity Test**

A problem of multicollinearity is said to exist where the correlation coefficient of the two variable exceeds 0.7. (Ho & Wong, 2001). The Variance Inflation Factor (VIF) of the variables was used to ascertain if the independent variables presented a multicollinearity problem. VIF describes the extent to which an independent variable explains another independent variable within the model. As a basic rule, Field (2009) argues that if the correlations coefficient of any independent variable exceeds 0.7 or its VIFs is greater than 10, there is a likely cause of multicollinearity.

### **Data Validity and Reliability**

The researcher carried out a pilot study to pretest the validity and reliability of data collected using the questionnaire. According to Berg (2004) validity is the degree by which the sample of test items represents the content the test is designed to measure. Content validity which was employed by this study is a measure of the degree to which data collected using a particular instrument represents a specific domain or content of a particular concept. Mugenda and Mugenda (2009) contend that the usual procedure in assessing the content validity of a measure is to use a professional or expert in a particular field. According to Shanghverzy (2003), reliability refers to the consistency of measurement and is frequently assessed using the test-relicts reliability method.

Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. The researcher selected a pilot group of 5 individuals each from the target population of the staff working in the selected commercial banks listed on the Ghana Stock Exchange to test the reliability of the research instrument. The pilot data was not included in the actual study. The pilot study allowed for pre-testing of the research instrument. The clarity of the instrument items to the respondents necessary so as to enhance the instrument's validity and reliability. The aim was to correct inconsistencies arising from the instruments, which ensured that they measure what was intended.

## **DATA ANALYSIS AND DISCUSSIONS**

### **Context of Research Sites**

The data was collected from six commercial banks listed on the Ghana Stock Exchange. The principal researcher with the help of three research assistants distributed the structured questionnaires to the selected commercial banks. The questionnaires were initially dropped at the banks with respondents who showed interest in participating in the study. The essence of dropping the questionnaires was to ensure privacy and comfort so as to draw objective responses to the questions contained in the questionnaire. Again, the fast paced operations in the banks could have compromised the responses as respondents could have rushed through with responses and lastly, the presence of the researcher and the research assistants could have influenced the responses to the questions to please the researchers. Respondents were given 'enough' time (i.e. two days) to respond to the questionnaire.

That is, all the sixty (60) questionnaires were distributed on Wednesday to the selected commercial banks and retrieved on Friday of the same week. Also, additional information was retrieved from the websites of the selected commercial banks. This information, return on assets (ROA), was important to measure the profitability of the selected commercial banks after financing major projects which requires a lot of financial support. The extraction of the secondary data from the various websites of the selected commercial banks was done by the principal researcher.

## Analysis of Questionnaire

Socio-demographic characteristics of respondents from the selected commercial banks in Ghana are presented in Table 5.1. Majority of the respondents who agreed to participate in the study were females (55.0%). This implies that female banking workers were more accommodating during the administration of the questionnaire. Additionally and per my observation during the administration of the questionnaire, it was realized that most of the female workers were less inundated with lots of work, hence, had time to respond to the questionnaire compared to their male counterparts. Also, most of the respondents were less than 30 years of age (66.7%).

The youthful respondents imply that the banking industry is infusing the young with the experienced in order to devise of creating access. This is essentially important because of the many millennials who are technology driven and can easily apply such knowledge in gaining competitive advantage for their respective banks. Another observation during the administration of the questionnaire which has implications for the findings is that most of the respondents were 'fresh' recruits, hence the young ages of the respondents. Additionally, most of the respondents were first degree holders (60.0%). The finding suggests that an undergraduate degree is the minimum entry requirement to work in the banking industry.

The banking industry with for a lot of sophisticated individuals and professionals with varying demands, hence, being a university graduate afford the stakeholders of commercial banks the peace of mind to entrust the growth of the bank to their academic knowledge. The respondents were sought from different departments of the selected commercial banks. Among the departments from where respondents were recruited from include operations (53.3%); risk management (20.0%); credit (16.7%) and finance (6.0%). The choice to sought opinions from the various departments was to deduce the 'true' stance of the various banks on financial engineering methods adopted to finance projects in Ghana.

**Table 5.1 Socio-demographic Characteristics of Respondents**

Variables	Frequency	Percentage
<b>Gender</b>		
Male	27	45.0
Female	33	55.0
<b>Age of Respondents</b>		
Less than 30 years	40	66.7
31-40 years	20	33.3
<b>Educational Level</b>		
First degree	36	60.0
Master's degree	18	30.0
Doctor of Philosophy (Phd)	6	10.0
<b>Department of Work</b>		
Operations	32	53.3
Risk management	12	20.0

Credit	10	16.7
Finance	6	10.0

### Descriptive Statistics

Details of the descriptive statistics are shown in Table 5.2. The mean value of ROA is 0.36 and standard deviation of 0.09 and minimum and maximum values of 0.126 and 0.512 respectively. This implies that the selected commercial banks have a positive return on assets from the last decade (2009-2019). Additionally, the positive outlook of ROA suggests that the selected commercial banks are more likely to finance major projects and still make profits without running into bankruptcy.

**Table 5.2 Descriptive statistics of ROA and Age**

Variables	Obs	Mean	Std. Dev.	Min	Max
ROA	60	0.36	0.09	0.126	0.512

ROA=Return on Asset

### Project Finance Market

The various project finance market adopted by the selected commercial banks are presented in Table 5.3. From the selected commercial banks, only 3.4% of the respondents strongly agreed that their banks use sponsorship to finance major project in Ghana. The implication is that sponsorship normally has no ‘legal’ binding for repayment. In other words, when a commercial bank sponsors a major project, it pre-suggests that the commercial bank forges a partnership agreement with the company undertaking the project; hence, paying back the monies and profits are not feasible. For the banks to make returns (profits) for financing projects, sponsorship is not a profitable venture.

Similarly, only 6.7% of the respondents strongly agreed as opposed to the 40.0% who strongly disagreed that the selected commercial banks do not use contractor and equipment suppliers as a means of financing projects. The result implies that paying for contractors and equipment has no financial gains for commercial banks considering that banks live off the profits they make from financing major projects. The disagreement that contractor and equipment supplier is a project finance market instrument by commercial banks suggest that investing in such venture is not profitable enough for the banks. It was, however, strongly agreed by more than half of the respondents (83.4%) that insurance provisions is a profitable project finance instrument used by the selected commercial banks. This suggests that companies undertaking major projects that pose inherent risk are likely to ‘buy’ insurance packages for workers from commercial banks. Undergoing such processes, documentation for the purchase of the insurance, coupled with the advantages inherent in such investment increases the profitability of the selected commercial banks.

**Table 5.3 Project Finance Market Instrument by Commercial Banks**

Variables	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Sponsor (Sp)	41 (68.3)	17 (28.3)	-	-	2 (3.4)
Contractor and equipment supplier (CES)	24 (40.0)	27 (45.0)	3 (5.0)	2 (3.3)	4 (6.7)

Financial advisors (FA)	27 (45.0)	29 (48.4)	-	2 (3.3)	2 (3.3)
Technical advisors (TA)	18 (30.0)	38 (63.3)	-	-	4 (6.7)
Legal advisors (LA)	22 (36.7)	32 (53.3)	2 (3.3)	-	4 (6.7)
Equity advisors (EA)	11 (18.3)	13 (21.7)	15(25.0)	13(21.7)	8 (13.3)
Insurance providers (IP)	2 (3.3)	-	8 (13.3)	-	50 (83.4)

### Instruments used in Financing Projects by Commercial Banks

The various instruments used in financing projects by the selected commercial banks are presented in Table 5.4. From the selected commercial banks, 6.6% of the respondents agreed to a very great extent that their banks use capital structure as an instrument for financing projects in Ghana. The implication is that the selected commercial banks use capital structure as a means of striking a balance between debt and equity in order to adequately finance the assets, daily operations and future growth of the selected commercial. Stated differently, though a minority of the respondents from the selected commercial banks use capital structure, it inure to the growth and financial development of the selected commercial banks. However, majority of the respondents, 66.7%, to a little extent agreed that loans are used by the selected commercial banks as an instrument in financing projects. The results suggest that advance loans to companies and individual contractors undertaking major projects as a means of making returns. That is, the selected commercial banks advance a loan facility to the recipient who is liable to repay the loan with the interest as agreed between both parties as well as the principal. The tendency for recipients of the loan facility to repay is a ‘threat’ to the assets of the selected commercial banks, hence, the reliance on such financial instrument is not wholly adopted by all the selected commercial banks.

Similarly, most of the respondents, 80.0%, agreed to a moderate extent that bonds are used by the selected commercial banks as an instrument in financing projects. The use of bonds as an integral component of the financial instruments used by the selected commercial banks suggest financing a project will be paid back exclusively by the flows generated by the project without recourse to other flows generated by the initiator of this project. The possible gains from the issuance of bonds for the selected commercial banks are a contributing factor for its use. To a great extent, 76.7% of the respondents agreed that equity is used as an instrument for financing projects. The result implies that the selected commercial banks finance major projects through the process of ‘selling’ shares to raise capital. This instrument is imperative considering that companies require money because they might have a short-term need to pay utility or they might have a long-term goal and require funds to invest in order to execute their projects within expected timelines.

**Table 5.4 Instruments used in Financing Projects by Selected Commercial Banks**

Variables	1, n (%)	2, n (%)	3, n (%)	4, n (%)	5, n (%)
Capital structure (CS)	37 (61.7)	9 (15.0)	10 (16.7)	-	4 (6.6)
Loans (LO)	4 (6.6)	40 (66.7)	4 (6.7)	4 (6.7)	8 (13.3)
Bonds (BO)	4 (6.6)	-	48 (80.0)	2 (3.4)	6 (10.0)

Equity (EQ)	2 (3.3)	-	4 (6.7)	46 (76.7)	8 (13.3)
Debt (DT)	50 (83.3)	-	2 (3.3)	2 (3.3)	6 (10.0)

1=No extent at all 2= Little extent 3= Moderate extent 4= Great extent 5= Very great extent

### Market Innovations used by Commercial Banks to Finance Projects

The market innovations used in financing projects by the selected commercial banks are presented in Table 5.5. From the selected commercial banks, 10.0% of the respondents agreed but to a little extent that their banks create value through pricing. The implication is that the selected commercial banks use competitive pricing to court companies to borrow money from them to fund their projects. Once the pricing, for instance, interest rate, is competitively lower there is the tendency for more companies to approach the commercial bank for assistance. The effect of this approach is that the banks make profits and the companies also complete their projects while making gains.

It was agreed but to a little extent by 76.7% of the respondents that the availability of resources and capabilities by the selected commercial banks are innovative ways of courting businesses to the bank. The result suggests that dedicating a makeshift research and development department through the provision of free consultation enlighten prospect business associates to appreciate the products being offered to them in order for them to make the 'right' choice. Making the 'right' choice has positive implications on the repayment of the loan.

Nonetheless, majority of the respondents, 76.7%, agreed to a great extent that an aggressive anticompeters marketing campaigns are innovative market approach used by the selected commercial banks to 'poach' businesses. This implies that beating off competition by approaching businesses to offer them financial assistance is an approach the selected commercial banks used to drive 'traffic' to their banks. Since most commercial banks survive on the profits that accrued on the loans they give out to businesses and individuals, this approach is highly profitability to the selected commercial banks.

**Table 5.5 Market Innovations adopted by Selected Commercial Banks to Finance Projects**

Variables	1, n (%)	2, n (%)	3, n (%)	4, n (%)	5, n (%)
Creating value through pricing (CVP)	50 (83.4)	6 (10.0)	2 (3.3)	-	2 (3.3)
Availability of resources and capabilities (ARC)	6 (10.0)	46 (76.7)	4 (6.7)	2 (3.3)	2 (3.3)
Customer satisfaction and retention (CSR)	54 (90.0)	6 (10.0)			
Creating and nurturing strong products (CNS)	52 (86.7)	4 (6.7)	2 (3.3)	-	2 (3.3)
Aggressive anti-competitors marketing campaigns (AMC)	8 (13.3)	2 (3.3)	46 (76.7)	-	4 (6.7)

1=No extent at all 2= Little extent 3= Moderate extent 4= Great extent 5= Very great extent

1=No extent at all 2= Little extent 3= Moderate extent 4= Great extent 5= Very great extent

## Product Innovations

The various instruments used in financing projects by the selected commercial banks are presented in Table 5.6. From the selected commercial banks, 80.0% of the respondents agreed to a great extent that their banks innovative product that attracts a lot of businesses is the quality of their operating systems. The implication is that the selected commercial banks use up-to-date technology that does not falter to make transactions easier and faster. Technologies such as efficient and proactive social media pages that enhance easy communication is an innovative product that makes access to the banks easier. Another set of product innovation adopted for use by the selected commercial banks are information intensity (76.7%) and specialization of business (76.7%). This suggests that the selected commercial banks inundate the media space with lots of information on the products the banks offer. This way, the bank becomes the primary destination for most businesses that need money to roll out projects. Additionally, the banks while putting their products out there in the public are specific on the type of products they offer and their area of expertise.

**Table 5.6 Product Innovation Adopted by Selected Commercial Banks**

Variables		1, n (%)	2, n (%)	3, n (%)	4, n (%)	5, n (%)
Quality of systems (QS)	the	-	-	8 (13.3)	48 (80.0)	4 (6.7)
Information intensity (II)		-	46 (76.7)	6 (10.0)	6 (10.0)	2 (3.3)
Specialization of business (SB)	of	4 (6.7)	46 (76.7)	6 (10.0)	4 (6.7)	-
Management support competitive strategies (MCS)	of	11 (18.3)	12 (20.0)	16 (26.7)	11 (18.3)	10 (16.7)

1=Least affected 2= Little affected 3= Moderately affected 4= Greatly affected 5= Most affected

## Regression Analysis

Details of the correlation analysis showing the association between the dependent variable (return on assets [ROA]) and independent variable (project finance market, project finance instrument, market innovation and product innovation) are shown in Table 5.7. The importance of undertaking the correlation analysis was to determine the presence or absence of multicollinearity based on the magnitude of the correlation coefficient. According to Wooldridge (2005), a correlation coefficient above 0.8 between explanatory variables should be corrected for multicollinearity. Stated differently, when a variable has a co-efficient equal to or greater than 0.8, it is near perfect or highly correlated. The correlation between financial performance (ROA) and project finance instrument is positive and significant ( $r = 0.348$ ). Similarly, there was a positive significant association between ROA and market innovation ( $r = 0.234$ ). However, the correlation between ROA and product innovation was positive but insignificant ( $r = 0.139$ ). From the correlation matrix, none of the variables was highly correlated with another.

**Table 5.7 Correlation Matrix between Market Innovations and Project Finance (ROA)**

Variables	ROA	PFM	PFI	MI	PI
ROA	1.00				
Project finance market (PFM)	0.138	1.00			



Project finance instrument (PFI)	0.348**	0.166	1.00		
Market innovation (MI)	0.234*	0.517**	0.075	1.00	
Product innovation (PI)	0.139	0.249**	0.039	0.039	1.00
**= significance at 5% confidence interval (0.05)					
*=significance at 1% confidence interval (0.01)					

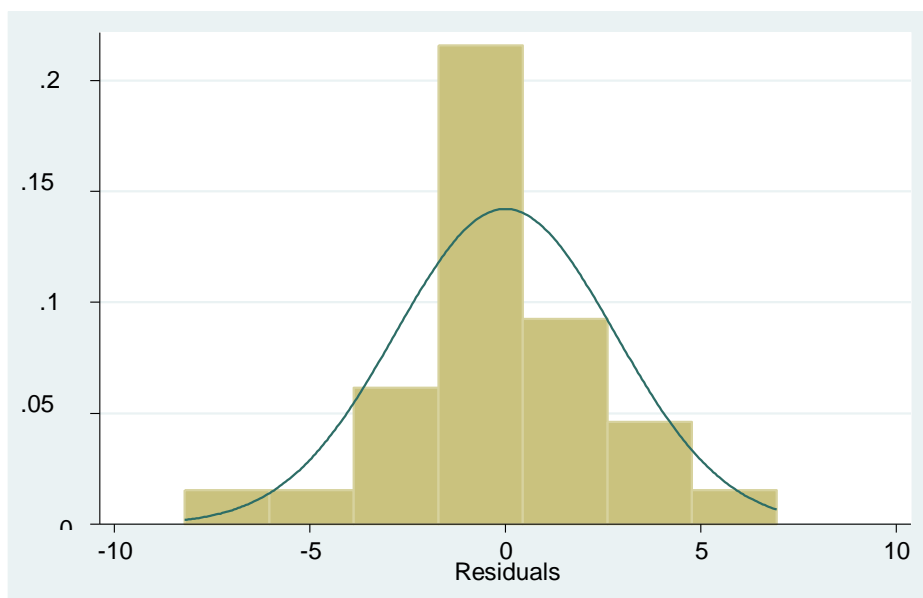
In order to further ascertain the absence of issues of collinearity, the Variance Inflation Test (VIF) test was undertaken (Table 5.8). Findings from test proved that none of the variables had collinearity issues and as such all the variables were included in the regression model.

**Table 5.8 Multicollinearity Test of Study Variables**

Variable	VIF	1/VIF
PFM	1.73	0.576506
PFI	1.88	0.531752
MI	2.57	0.389283
PI	1.37	0.728332
<b>Mean VIF</b>	<b>1.89</b>	

### Normality Test

In order to reduce the effect of outliers and to ensure a normal distribution of the data, a test for normality was conducted (Figure 5.1). The model is well fitted, thus there is no pattern to the residuals plotted against the fitted values. Stated differently, there is homogeneity of the variance of the residuals.



**Figure 5.1 Test for normality**

### Skewness/Kurtosis Tests for Normality

In this study, the Skewness and Kurtosis test was conducted on the data to ascertain its normality (Table 5.9). As a guideline, normal data are assumed to have skewness and kurtosis values near 0.

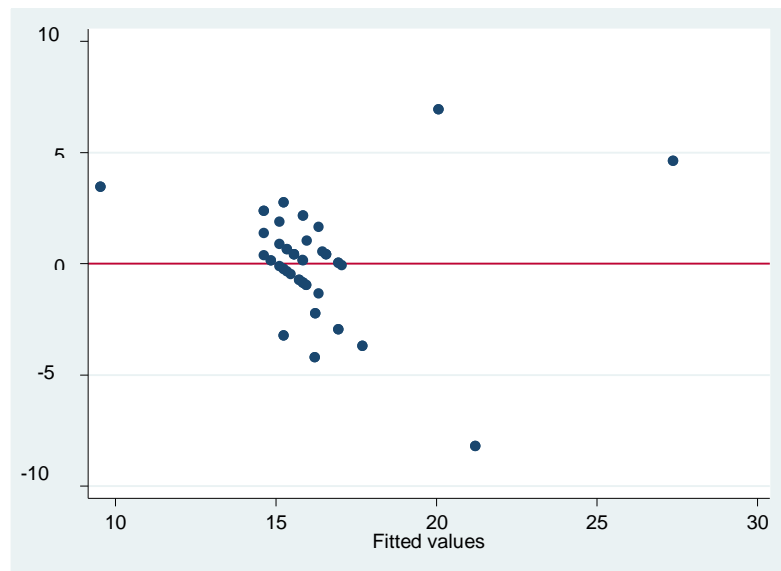
Therefore, if the values are not near zero, then the data cannot be said to be distributed normally. According to Field (2009), the value of skewness (asymmetry) and kurtosis should be zero or close to zero if data normality is to be determined using skewness and kurtosis. He argues that once the value for skewness is greater than 1.96 and for kurtosis is greater than 3.29, it means that the data is not normally distributed. Hence, from the values obtained for Skewness and Kurtosis, the data is considered normally distributed.

**Table 5.9 Normality Test of Skewness and Kurtosis**

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Joint Adj chi2 (2)	Prob > chi2
Resid	60	0.2428	0.0265	5.92	0.0518

### Homoscedasticity Test

Details of the homoscedastic test as part of the assumptions for the regression analysis is shown in Figure 5.1. The test was undertaken to determine whether standard errors in the model are homoscedastic so that they can be corrected. Subsequently, there was constant variance between the residuals and fitted values.



**Figure 5.2 Test of homoscedasticity**

The regression model measured with multiple predictors (project finance market, project finance instrument, market innovation and product innovation) against the dependent variable was statistically significant ( $R^2 = 0.4941$ ; Adjusted  $R^2 = 0.4574$ ). The correlation of determination (Adjusted  $R^2$ ) value of 0.4574 meant that close to 46% of the total variability in project finance is affected by the independent variables (Table 4.10). To determine whether the regression model was a good fit for the data, ANOVA was adopted (Table 4.10). The regression model is a good fit for the data as evidenced by F ration, which is  $F(4, 55) = 13.43, P > 0.000$ . The F-statistics was used to establish whether the regression equation explained significantly a greater amount of the effect on factors that influence project finance that would be accounted for other than by chance. The project finance can be predicted using the independent variables since the significance level is less than 0.05. In other words, the study rejects the null hypothesis in favour of the alternate hypothesis that project finance market, project finance instrument and market innovation has statistical significance on finance project.

There was a significant but negative association between project finance market and project finance ( $\beta = -0.498$ ;  $\rho = 0.004$ ) holding all other variables constant. There is about 50.0% increase in project finance for every unit decrease in financial engineering strategies such as project finance market among the selected commercial banks. Since the p-value is less than 0.05, the null hypothesis is rejected in favour of the alternate hypothesis that project finance market such as the provision of insurance. Also, there was a significant but positive association between project finance instrument and project finance among the selected commercial banks ( $\beta = 1.059$ ;  $\rho = 0.000$ ) holding all other variables constant. For every unit increase in project finance instrument, there is about 94.0% increase in project finance among the selected commercial banks. The null hypothesis is rejected in favour of the alternate hypothesis, since the p-value is less than 0.05 that project finance instrument such as aggressive anti-competitors marketing campaign, influence project finance.

Holding all other variables constant, market innovation was significantly associated with project finance ( $\beta = 0.609$ ;  $\rho = 0.001$ ). That is, for every unit increase in market innovation, there are about 61.0% increases in project finance among the selected commercial banks. Since the p-value is less than 0.05, the null hypothesis is rejected in favour of the alternate hypothesis that market innovation such as quality of the system instituted influence project finance.

**Table 5.10 Multiple Regression Analysis between Financial Engineering and Project Finance**

Variables	$\beta$	Std. Error	t-test	p >  t				
PFM	-0.498	0.163	-3.05	0.004 **	PFI	1.059	0.157	6.75
MI	0.609	0.172	3.54	0.001 **	PI	0.033	0.027	1.24
<b>Model Summary</b>								
<b>Statistic</b>								<b>Value</b>
F (4, 55)								13.43
Prob > F								0
R <sup>2</sup>								0.4941
Adjusted R <sup>2</sup>								0.4574
N								60

\*\*= significance at 5% confidence interval (0.05)

## CONCLUSIONS

### Summary

The study offered insightful knowledge on the process of financial engineering for project finance and on the various instruments that can be employed for project profitability and financial robustness. The purpose for undertaken this study was to facilitate the formulation of financial packages for privately financed projects, based on the merits and suitability of the financial instruments available, and independent of bias that may arise from familiarity with certain package formats or from lack of understanding and experience. In order to answer the research problem, this research adopted a questionnaire survey design.

This research was compiled with principles which aimed at protecting the privacy of every individual who, in the course of the research work was requested to provide personal or commercially valuable information about themselves. This research focused on the banking industry with spotlight on banks listed on Ghana Stock Exchange with operations in the Accra Metropolitan Assembly only. Consequently, the population in this study was the management and staff in the banking industry, commercial, universal and investment banks. Purposive sampling was used to select the sample within the population. Both primary (questionnaire) and secondary (audited financial records) data were employed for the study.

The data were collected to cover every aspect of the research. The questionnaire was divided into four thematic areas consistent with the research objectives. The secondary data (financial records) was collected from 2009 to 2019. Descriptive statistics was used to analysis the individual variables that collectively formed the main financial engineering variables. Additionally, inferential statistics, specifically multiple linear regressions, was undertaken to assess the relationship between financial engineering and project finance (defined for the purpose of this research as return on assets). Prior to the multiple linear regressions, the assumptions that necessitate this type of analysis were undertaken so as to ascertain the ‘authenticity’ of the final results.

### **Findings and Discoveries**

There was a significant but negative association between project finance market and project finance holding all other variables constant. This suggests that when financial engineering strategies such as project finance markets which includes sponsorship, legal advice and the provision of insurance is not done well; financing projects by the banks will be a less profitable venture.

Also, there was a significant but positive association between project finance instrument and project finance among the selected commercial banks holding all other variables constant. The implication of this is when the outcomes of project finance instrument such as capital structure, loans and equity increases or yields positive results, the profits derived by the selected commercial banks are same as the results of the financial engineering strategy/ies adopted. Holding all other variables constant, market innovation was significantly associated with project finance. This implies that when market innovations adopted by the selected commercial banks increases, financing projects by the banks will yield the same level of profits.

### **RECOMMENDATIONS**

Through the use of descriptive and inferential statistics, the objectives and hypothesis that guided this study have been realized. While three of the hypotheses were realized, one was rejected. There was a significant but negative association between project finance market and project finance. Since the pvalue is less than 0.05, the null hypothesis is rejected in favor of the alternate hypothesis that project finance market such as the provision of insurance. Also, there was a significant but positive association between project finance instrument and project finance among the selected commercial banks. The null hypothesis is rejected in favor of the alternate hypothesis, since the p-value is less than 0.05. Holding all other variables constant, market innovation was significantly associated with project finance. Hence, the null hypothesis is rejected in favour of the alternate hypothesis since the p-value is less than 0.05. Based on the limitations as outlined in section 6.3, the following recommendations are formulated.

The commercial banks in Ghana need to employ various product innovation strategies such as product range extension, product replacement, and product improvement, product repositioning and new product introduction to enable the banks to be more productive, to grow faster, to invest more and also to earn more profit. The product development strategies can be effectively adopted if there are quality systems in place, there is good information flow, there is specialization and also if the management fully supports the competitive strategies. The power of product innovation in helping companies retain and grow competitive position is indisputable.

### **Conclusion**

The study concludes that commercial banks in Ghana have adopted various financial engineering strategies aimed at improving project finance and by extension of financial performance. Specifically, the study found out that project finance by the selected commercial banks is negative but significantly associated with project finance market. Also, a positive significant association was observed between project finance and project finance instrument. Similarly, market innovation was positive and significantly associated with project finance among the selected commercial banks. Though there was a positive association between product innovation and project finance, this association was statistically insignificant.

These findings are significant to the lending sector, which has a need to remain abreast of profitable alternatives in the project financing market as it reviews the practices adopted by banks during the preparation of bids. Such insight is particularly useful when performing due diligence on the financial aspects of the bids. In furtherance to this, it will serve as a source of assessment for further research into issues of project finance and assist other countries to be more responsive to the financing of project. The purpose of conducting this study will help policy makers such as Government agencies to enhance developmental project by providing appropriate services to suit changes contemporary to financing of projects.

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