

# Effects Of Capital Asset Pricing Model On Portfolio Performance: A Case Study Rwanda Stock Exchange

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## ABSTRACT

*This study focused on the effect of the capital asset pricing model on portfolio performance a case, the Rwanda stock exchange. The investor's main objective is to maximize returns in a risky environment. Portfolio management provides more insight into returns and risks, but it requires reliable and relevant information to be able to generate a reliable and relevant report for the investor to make an informed decision. However, the problem is how to connect CAPM to risk management in emerging economies. To gather the data, the study included stratified and purposive sampling methods. Various groups were created for the target demographic based on their occupations and types of employment. The study's objectives were used to establish the sample size for each category. Purposive and stratified sampling was the sample methods employed for each category. Pre-testing and repeated activities ensured the reliability and validity of data collection instruments, and descriptive statistics were used to analyze data. Findings are presented in Chapter 4. A summary of the applicable sampling procedure, including the target population, samples chosen, and sampling methodology employed for each type of employee, is given in Table 3.0.1. There was a total of 112 samples, with a standard deviation of 17.59. The formula  $n = n / (1 + N * e^2)$  was used to estimate the sample size, where  $n$  stands for sample size estimates,  $N$  for the sample size taken from the targeted population, and  $e$  for error. In this instance, the sample size estimate was determined to be 88, with a 95% confidence level indicating a lower limit of 53 and an upper limit of 122. Secondary sources, including books, newspapers, journals, reports, and the internet, were used to collect the data. These results show that CAPM is not widely applied and is not thought to be very practical in the setting under study for making investment decisions. Due to a lack of training and reliance on borrowed models, most respondents had concerns regarding the accuracy and effects of CAPM. The CAPM's asset allocation was acknowledged as its most crucial element. For instance, Table 4.1 revealed that when asked if they had ever utilized CAPM as a cost estimation technique, 75% of the respondents responded. Table 4.2 showed that 85% of respondents were in favor of using CAPM to help choose assets, but Table 4.3 showed that 92.5% of respondents did not think CAPM was practical. Additionally, Table 4.4 showed that 80% of the respondents firmly believed that the CAPM is relevant for asset allocation. The results indicated that respondents' opinions on the respondents' use and efficacy of CAPM in their investment decisions varied widely. These results show that CAPM is only occasionally used and is not thought to be useful in the situation being researched. With inadequate training and a reliance on borrowed models, most respondents expressed skepticism over the accuracy and usefulness of CAPM. The most crucial CAPM component was acknowledged to be asset allocation. Chapter 5: Recommendation: CAPM is not a panacea, but it offers better risk and returns information than traditional methods. However, it has limitations and assumptions, and traditional methods lack a framework. Further study should consider incorporating CAPM into emerging economies to provide investors with better information on investment opportunities and maximizing objectives*

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## I. Introduction

This chapter provides the background of the study, the problem statement, the objective, and questions, the significance of the study, and the limitation of the study. The chapter is wrapped up with the organization of the study.

### Background of the study

The financial security market is an aggressive market with an array matrix of challenges existing, and it has become a subject of concern as globalization gets more expansive and appealing to investors. Emerging economies have become the center of business for the developed economies. The instantaneous report from (Global stock markets,2019) depicts the market trend of the performance with most of Rwanda stock exchange portrayed as the best places for investment as well as risky environments.

However, investors seek still to invest in those risky areas as the higher the risk the higher the returns. In the words of one of the prolific investors, "Risk is what life is made up of, learn how to manage by making the best out of it rather than being scared of it."

The essence of this growth is rooted in the expansive investments which have been traced to the developed markets. From advanced platforms to the dark corners of the developing world, the change in this trend has precipitated the urge to review the breakdown of finance components which are planning, finance decision, and returns policy. Due to globalization, the viability of business projects has broadened the horizon of business and generated vast techniques revolving around how to track the expected returns under different risks. These lead to the portfolio management concepts that are related to CAPM.

While the developed countries are able to assess and verified that CAPM is reliable as depicted in (the New York stock exchange, 2018), (the Tokyo Stock Exchange, 2018), and others have relied upon the context of cost estimation to be able to verify the extent to which the valuation of the projects. By (Keith K. Reilly & Calvin Brown, 2010), portfolio management gives more insight into portfolio appraisal in the selection of the most efficient security by analyzing the risk and return at certain point levels. By selecting assets that have negative covariance, the H.M. models depict to investors how to mitigate risk.

Organizations have a pool of portfolios so with them being managed and the combination has been done efficiently to reduce the risk using many ways to mitigate it.

However, in Rwanda stock exchange, it seems not to be relevant due to an array of challenges in resurgence: the striving economics that may want to use the cost estimation model. CAPM is at the core of the assessment of cost estimation models that have within the years been used in risk management which is the basis of making most decisions. Researchers have also made an insightful view in accordance (Fama & Mac Beth, 2018).

RSE is not unique to this study, as before this, various researcher has been able to make assess the use of CAPM in risk mitigation as related to (An Indian Journal, 2014) researching the risk management using CAPM as a portfolio management concept in China which is considered a developed country. The resurgence of this research paper focuses on the local and emerging economies about the effects of CAPM. Rwanda stock exchange (RSE) is a local financial institution, formally incorporated in Rwanda on 7th October 2005 set the operation trends and exchange of marketable securities. The inception of the entity can be traced back to the days of the revolution of professionalism penetration in Rwanda in 2011 and to be specific on 31st January 2011.

The Rwanda stock exchange has 10 listed companies according to its report (Rwanda stock exchange report, 2018). RSE has made some strides towards engaging its affair not only to the local market but also to cross border listing incorporating other companies from their neighboring countries into their listing. The geographical scope of this study will cover Kigali city of Kigali which is Rwanda's capital city with a total population of 859,332 according to (World population review, 2018), this represents 7% of the total population of the City which is projected to be 12.5 million; with a GDP of 10.6 % and projected economic growth of 7.2% following the (New times, 2018).

The time scope ranged between 2012 -2018 when the Rwanda stock exchange commences its operation as reflected in the prospectus (Rwanda Stock Exchange, 2019). Which has gradually been growing with ambitious strides towards the incorporation of the cross-border listing and currently with a market capitalization of Rwf. 2,895,512, 844,476. As per the (Rwanda Stock Exchange Market Report, 2018): with a total list company of 10 at the national index stock index of 131.60 as cited in the (Rwanda stock exchange report, 2018).

### **Statement of the problem**

According to the Rwanda stock exchange, the use of CAPM in emerging countries is still not efficient as the basis of risk management and in the long as the basis of decision making. As a Concerned financial researcher, consultancy services engagements at (JDD, 2017), and author of this research, return and risk has been the core of investment decision, however, can CAPM statistically offer the basis of risk management and returns sustainability to investors.

While CAPM is believed to be the most popular approach due to its reliability and also its effects as a cost of equity measure as cost of capital estimation under financing and investment decisions, that is used by the most financial planner as an appraisal technique to obtain the NPV (Net present value), IRR (internal rate of return), profitability index and the and the latest dispensation of MIRR (modified internal rate of return).

Emerging countries have been faced with an uphill task on how to incorporate the concepts of risk and return as per financial researchers and analysts. However, in accordance with (Bloomberg Business channels,2019) and (UNCTAD, 2006), technological and innovation have accelerated the global financial market, and hence the risk and returns have become a major pillar to the decision-making process.

Managing risk and returns has become more vital to the expansive market and global dynamics have become a challenge to which method to apply and if so, is it practical. CAPM resonates with this idea in that it offers what is the closest form of analysis that can give a more realistic aspect other than the other prior methods that have failed to capture an array of vital data. Rwanda's economy has been at the forefront of luring investors and trying to keep the business environment. It has even put measures to assess security movement, performance,

and exchanges by establishing the RSE. However, as mentioned the risk and returns information from the RSE has been vague and tied to hypothetical estimation and traditional methods.

This is supported by the letter issued to secure more information at a certain point during my consultancy task as seen in the appendix below, which was fruitless hence setting the pace to the study on the essence of CAPM and effects in risk management.

The trends of financial risk and valuation have reached a remarkable level in recent years and cannot be overlooked as they have attained the same vital strength in global scope without the exception of Rwanda stock exchange. CAPM has in-depth statistical analysis than other concepts and hence also generate many questions such as to what the degree of CAPM in risk is and return management in markets, in the view of Rwanda stock exchange, and which strategies are being used to determine the CAPM aspects in financial decisions, performance, decision making, and risk assessment.

The Rwandan market is growing rapidly and embracing globalization which means the risk assessment and mitigation is the backbone of making any rational investment decision.

Parameters are also emerging and putting growth to question what the return and risk is connected to this growth. As an ardent finance scholar: this has to do with CAPM easing this through the ascertainment estimation of cost of capital estimation and returns. The cost of capital estimation is used to show the potential present value and the relative changes in money across time. The value of money changes across time can lead to an appraisal of projects hence ascertaining whether it is worth undertaking certain projects.

## **Objectives of the study**

### **General objectives**

The general objective was to ascertain the effects of capital asset pricing model on portfolio management which involves the components that are related to the risk and returns (portfolio management).

### **Specific objective**

The scope of the research is narrowed to the specific objectives are aligned to;

1. Examine how portfolio performance and the CAPM are related: Examine the effect of CAPM on portfolio returns and decide if the model accurately predicts portfolio returns.
2. Analyze the market portfolio's effectiveness: Examine the market portfolio's effectiveness in accurately reflecting the risk and return characteristics of the entire market, as well as its acceptability as a benchmark for assessing portfolio performance.
3. Examine how changes in the risk-free rate affect portfolio returns and evaluate the relevance of the risk-free rate in the context of the CAPM to estimate the impact of the risk-free rate on portfolio performance.
4. Examine how the correlation coefficient affects the diversity of a portfolio: Examine the connection between portfolio diversity and the correlation coefficient, noting how correlation impacts a portfolio's risk and return characteristics.
5. Analyze the standard deviation's function in measuring portfolio risk: Determine the impact of standard deviation on portfolio selection and performance by evaluating its significance as a measure of portfolio risk inside the CAPM.
6. Find any anomalies or CAPM's shortcomings: Investigate any potential abnormalities or restrictions in the CAPM's presumptions and their effects on portfolio performance to gain knowledge about other portfolio management models or strategies.
7. Comparing CAPM projections to empirical portfolio performance Assess the accuracy of the CAPM by comparing the performance of actual portfolios to the projected returns predicted by the model, looking for any differences or recurring patterns.
8. Analyze how CAPM affects portfolio diversification tactics: Examine the CAPM's performance in directing portfolio diversification techniques, determining whether the model is effective. effectively captures the advantages of diversification and offers suggestions for the ideal asset allocation.
9. Consider CAPM's effects on portfolio risk-adjusted performance: Examine how the CAPM framework influences risk-adjusted performance metrics, such as the Treynor or Sharpe ratios, and decide if the model offers a solid foundation for judging the risk-adjusted returns of portfolios.

### **Research questions**

The study will seek to answer the following research questions on how to achieve the specific question mentioned above:

1. How does the CAPM model affect portfolio returns, and how well does it account for those returns?
2. To what extent does the market portfolio accurately reflect the risk and return characteristics of the entire market, and is it a fair benchmark for assessing portfolio performance?

3. How do variations in the risk-free rate affect portfolio returns, and what role does the risk-free rate play in the CAPM?
4. How does portfolio diversification under the CAPM framework relate to the correlation coefficient, and how does correlation impact a portfolio's risk and return characteristics?
5. How important is standard deviation as a gauge of portfolio risk in the CAPM, and how does it affect the choice of a portfolio?
6. What irregularities or restrictions in the CAPM's assumptions exist, and how do they affect the performance of the portfolio? Exist any other models or strategies that can overcome these restrictions?
7. How do portfolios' actual performance metrics stack up against the expected returns that the CAPM predicted? How reliable is the model in practice? Can any recurring trends or deviations be found?
8. How well does the CAPM direct methods for portfolio diversification? Does it offer the best advice for asset allocation and sufficiently reflect the advantages of diversification?
9. How do risk-adjusted performance metrics like the Treynor ratio and Sharpe ratio change as a result of the CAPM framework? Does it offer a trustworthy foundation for assessing the risk-adjusted returns of portfolios?

### **Significance of the study**

This academic research will help the researcher to fulfill the requirements of getting a master's degree. Also, by doing this work, the researcher gets acquitted with issues that are useful in day-to-day future life around study.

The institution of high learning; Mount Kenya university is body of knowledge hence this research will be used to benchmark the capability the of student's research and development skills.

The public includes people who have an interest in this subject. Among them are people like investors, financiers, brokers, and other stakeholders.

### **Delimitation of the Study**

A lot of research has been conducted in Rwanda, specifically Kigali. Most of the respondents knew the trending issues oversea but had less reflection to the local scenery due to capacity of the market which is still young and the illiquidity of the market. Second is that there is a language barrier that makes the respondents unable to effectively respond to the questionnaires and oral interviews.

### **Scope of the study**

#### **Content scope**

The former Rwanda Over-The-Counter (OTC) market was transformed, leading to the establishment of the RSE in 2011. It set out with the intention of giving investors and firms a clear, effective, and well-regulated platform on which to exchange securities. A major turning point was reached in Rwanda's financial sector with the creation of the RSE, which encouraged investment opportunities and economic growth.

#### **Geographical scope and Significance in the Rwanda economy**

The RSE located in Kigali. It is significant to the development of the Rwandan economy in a number of ways, including the following:

**Capital Formation:** The RSE gives businesses a platform to raise money by selling investors shares and bonds. This promotes infrastructural improvement, company growth, and broader economic progress.

**Investment Possibilities:** Through the RSE, individuals and institutions can invest in and take part in the ownership and expansion of listed firms. It promotes an investment culture and the mobilization of savings.

**Wealth Creation:** By taking advantage of capital growth, dividend income, and interest payments from traded assets, investors have the chance to make money through the RSE.

**Corporate Governance and Transparency:** Companies must adhere to strict regulatory and reporting criteria in order to list on the RSE.

**Research Goals and Importance** The following research goals may be explored in relation to the Capital Asset Pricing Model (CAPM) and risk management in the context of the RSE:

**Analyzing the CAPM's validity:** The CAPM is a popular model for estimating expected returns and evaluating risk in the financial markets. Making an assessment, of its effects on the RSE, assists investors to make wise selections by better understanding the variables affecting stock returns. Analyzing risk management methods on the RSE offers an evaluation of the efficacy of strategies used by listed businesses as well as their influence on stock returns and volatility.

**Increasing market efficiency:** By evaluating the relationship between risk and return, identifying opportunities to improve market efficiency, and identifying any market irregularities and offering changes to improve the market's overall efficiency.

Informing investment decisions: Investors can better understand the risk-return tradeoff, create well-informed investment strategies, and manage their portfolios by studying CAPM and risk management in the context of the RSE.

The scope is domesticated to the local domain but mapped to representation of global concepts of CAPM model in the essence of risk management. The management of investment is the basis of selection of investments that are attached to the returns of the investors required returns. RSE and its affiliates may also be young in the stock exchange hence historical trend may not have an enriched capacity as compared to other but still appeals as a representation to the emerging economies which also are simulation to it.

Overall, it is critical to investigate the effects of CAPM on portfolio performance in the context of the RSE in order to advance knowledge of the Rwandan capital market, foster investor confidence, and support sustainable economic growth in Rwanda.

### **Time scope**

The time lines that was actively engaged in collection of the data was between 2011 to 2020. These was in line with inception period of RSE and provided enough information that has transcended of the period as an active period that has transformed Rwanda investments landscape.

### **Organization of the study**

Chapter one gives an insight to the introduction, background of the risk and returns. It further elaborates the reasons why it is necessary to pursue the research and to this is designed through objectives that are general and specific. The breakdown of questions is interlinked to the objectives of the research and gives room to the framework of the designed questionnaire, with practical case of the RSE and its affiliates and subjective limitations that are encountered in the process of the research.

Chapter two gives an overview of the prior research done in line with this area of risk and returns. Further reflects on the theories and breakdown of the variables connected to the components of risk and returns and then details with prior reference.

Chapter three answers the question as to how the research will try to uncover the underlying problems as mentioned in the problem statement. It incorporates a lot of statistical inferences that also link to the statistical quality.

Chapter four gives an answer to what was outcome of the research done and the analysis of the meaning and interpretation of the outcome. Hence the definitive aspect of its chapter is summary and presentation while chapter five concludes on the outcome and recommendations on the researched topic.

## **II. LITERATURE REVIEW**

### **Introduction**

Chapter two is categorized into three highlighted main sections; the first section discusses the theories supporting the study. These are scientifically tested theories by renowned scientists and researchers.

The second part highlights empirical literature which highlights the work conducted by the scholars in the related field of study. The third part will entail the critical review of the study which brings out the opinion of the researcher.

### **Theoretical Literature**

The CAPM is considered a complex approach that involves statistical analysis to ascertain the movement of security (Sharpe , 1964) and (Lintner , 1965). CAPM has been researched upon and debated on with intellectuals and financial gurus, but it is theoretical concepts as a risk and return model have made it the robust model that is the force to reckon with. The CAPM concept has been useful in valuation and risk assessment of financial planning since the cost of capital or required return on the assets is the function of the beta 's coefficient subject to the underlying projected cash-flows.

The CAPM concepts have been modified, with more researcher building on it as to incorporate more dynamic of risk parameter gets to be more quantitative and variables of risk measure expand entire picture. Researchers, who subsequently built on prior work such as Jan Mossion, independently worked on Markowitz on diversification and modern portfolio theory (Harry M. Markowitz , 2016).

Not mention the two famous likes of Hamada who have validate the expansion of CAPM in capital structure theories (An indian Journal , 2014) and supported by (Brealey , Myers & Allen , 2010) with ( Scott D.Stewart ,2019) as sited in their research paper on further aspects of beta estimation.

CAPM has been incorporated in corporate finance in valuing the projects as tedious and safely appropriate tool of appraisal in decision making with consideration of that the assumptions of CAPM.

The effects and use are quite a puzzle, as mostly the assumptions are upheld, and the assessment of risk and returns has been expressed through papers of research and examinations but the essence of it risk and return management is daunting task.

As mentioned **Error! Reference source not found.** other financial authors and researchers have found CAPM as a reputable and undisputed concept, hence advanced more research on it to modify to incorporate another parameter.

The incorporation of the other aspects by financial dynamics has developed beta equity and beta assets by researchers as (Hamada, 2015) and Roll and Rose in extension to CAPM background the Arbitrage Portfolio Theory (APT) was created. The essence of this equation has been formidable informing the criteria of evaluation and techniques of appraisal that are core to the investment decision that is paramount to the decision-making process.

The assessment of this derivation has depicted the relation of the underlying security and market security degree of movement as analyzed in covariance.

The resonating facts has been that covariance is an additive and homogenous, with the derivation of the equation and conceptual insight in the CAPM, the assessment shows that the beta does not depend on equilibrium but the project's cost. Hence the beta assessment of the project is a point of disequilibrium not equilibrium.

Research and assertion from (Magni, 2007) and (Harry M. Markowitz , 2016) argued that the average use of CAPM is used in finance aspects to the core literature on disequilibrium status of the finance environment. This is according lighter with the financial researcher as (Ekern, 2007).

## **Empirical Literature**

### **Emerging economies in relation to effects of CAPM on portfolio performance.**

Despite all the references to CAPM as risk management is also used in Rwanda stock exchange although it is heavily borrowed CAPM statistically. Mostly because risk management concepts require a lot of statistical data and information to be used to make the basis of risk assessment. However, this is contrary to what happens in the developing economy as the risk management information is the fallacy that is just used from borrowed economies of developed economies. The capital-budgeting principle as seen in the prior reviews has depicted the derivation of how CAPM is vital to the cost estimation which is part of the decision-making process. Although Rwanda stock exchange have claimed to be the business hub and the pinnacle essence of business is to incorporate risk in capital budgeting which is the paramount information required by an investor. The foundation of CAPM has been critical to the emergence of modified CAPM which can be adapted to the Rwanda stock exchange to suit the tailored parameters of risk measures.

In their 2017 study, Chandra and Kumar looked at the CAPM's effects to the Indian stock market. Although the CAPM gave an acceptable estimate of expected returns, the study discovered that there were variations caused by market inefficiencies and country-specific factors. The researchers concluded that the model might need to be changed to consider these variances.

Rahman and Uddin (2018) studied the CAPM's capacity to explain stock returns in Bangladesh. According to the results, the CAPM did not accurately reflect the link between risk and return in the Bangladeshi market. The analysis made clear the necessity for more risk criteria and a more thorough method of asset pricing.

The researchers emphasized the need to incorporate market-specific risk factors into asset pricing models.

In a broader examination of emerging markets, Baele (2019) analyzed the performance of the CAPM across several Rwanda stock exchange. The study revealed significant cross-country variation in the risk-return relationship, suggesting that the CAPM's applicability varied across different market contexts. The researchers highlighted the importance of considering country-specific factors in asset pricing models.

A study by El-Helaly, (2019) investigated the applicability of the CAPM in the Egyptian stock market. Emphasized the need for new risk variables and a more thorough method of asset pricing.

The need for including market-specific risk characteristics in asset pricing models was stressed by the researchers.

(Baele,2019) examined the performance of the CAPM across many developing nations as part of a larger investigation of emerging markets. The risk-return relationship showed significant cross-country variance in the study, indicating that the CAPM's effects differed depending on the market setting. The significance of using nation-specific elements in asset pricing models was emphasized by academics.

Conclusion is that effects of CAPM has myriad of challenges: Hence this has made many emerging countries use CAPM that have been developed by developed countries.

The CAPM is built on assumptions such as perfect competition, rational investors, frictionless markets, and efficient information. However, these assumptions may not hold true in emerging economies due to market inefficiencies, country-specific risks, market segmentation and integration, data limitations, behavioral biases, and investor sentiment. These factors can lead to deviations from the predictions of the CAPM.

### **Capital budgeting decisions**

Developing economies have been viewed as beacon of investment. Many investors have taken up the risk to invest in the developing nations. However, they also have higher risk. Hence, the need factors these risks into

Investors' objectives are to have better returns from their finance options or investment decision: (Kristofik, 2010). The act of setting aside funds or fore-going other interest with the intention of investing either as equity or bondholder or both with the view of getting either variable or fixed returns and other related future benefits is what is called investment (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown & William Goetzman, 2013).

There are several areas or types that an investor is likely to invest in, such as; equity, bonds, and other related financial securities (Pandey, 2010). Investment analysis is a component of portfolio management. The breakdown of portfolio management is that it is an analysis of returns viz a viz the risk.

Investment opportunities have a significant impact on firm value. Therefore, we need a method that enables managers to make investment decisions appropriately with a focus on value maximization. This approach makes use of the predicted net present value (NPV) maximization criterion along with a discount rate based on the project's level of risk.

According to the NPV rule, an investment project should only be started if the discounted value of all its cash flows is more than 0. A risk-adjusted discount rate that takes the project's level of risk into account should be used to discount these cash flows. This rule is founded on the idea of opportunity cost, where managers evaluate whether an investment opportunity is worthwhile by comparing it to alternative investments or assets with comparable risk.

Managers must separately assess investment opportunities in settings with fragmented shareholders where there are a variety of ownership interests and preferences to optimize business value. The NPV rule offers a quantitative framework for evaluating an investment's ability to create value by considering and effectively discounting the cash flows it generates over time

In capital budgeting decisions, the discount rate must be chosen carefully. For calculating the discount rate, the capital asset pricing model (CAPM) is a key idea in financial theory. To determine the expected return on an investment, the CAPM considers the risk-free rate, beta (systematic risk), and market risk premium. Managers can choose a discount rate that reflects the investment's risk and is consistent with the objective of value maximization by employing the CAPM.

### **Risks and returns attribute at RSE**

Investment opportunities in developing nations exhibit specific characteristics when it comes to risks and returns. While the underlying principles of risk and return remain consistent, the unique context of developing nations introduces certain considerations. The definitions and classifications of risk, as discussed previously, are applicable to these investment opportunities.

Risk has been analyzed and defined in numerous ways: however, the underlying bottom line key take-ways always prevail in all definitions. Risk is a variant of the expected return (Harry M. Markowitz, 2016). As pioneered and concurred by a knight (1921), assertively affirms risk as a quantifiable causer that leads to various outcomes apart from the expected returns. Subsequently, this is concurred and seconded by Jorion (2000). Who defines risk as variant causer to expected returns.

A further definition is that risk is the uncertainty associated with the end-of-the period value of investment (William F. Sharpe, Gordon J. Alexander, and Jeffery v. Bailey, 1999). Its concurrence and affirmation were made popularly by Holton (2004) as his definitive words he stated that exposure to the take-ways either in the favorable or unfavorable state affects the expected returns hence creating uncertainty in investments.

The pool of definitions of risk has been dissected and analyzed. And hence in general, the risk is deviation or variant of returns from expected returns without risk. In other- words, risk causes an investor to have several returns (incomes) due to uncertainty (Investopedia, 2019). The association of risk to different underlying security single factor of risk variable but multi-factors of risk: liquidity risk, markets risk, default risk, gearing risk, etc. However, business risk is a component of two risks depicted as systematic risk and unsystematic risk.

Systematic risk is the risk that cannot be eliminated through diversification (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown, William Goetzman, 2013). Another way of defining it is the risk that is beyond investors' control, or the investor cannot extraordinarily be little about it other than adapting strategies that can mitigate it towards meeting his/her objectives and goals in the returns of the underlying security.

Systematic risk is classified into the following; market risk, interest risk, and inflationary risk. Market risk: is the sensitivity of the market in relation to the performance of underlying security. This type of risk is given heavy emphasis due to its association with CAPM: Interest rate risk. This is tied to the financial institutions that have an alternation of interest to suit the fiscal policy of the country as prescribed by the central bank. Inflationary

risk: this is a risk that affects the value of the currency weight hence the purchasing power risk is what could be associated with it. The decline in purchasing power is a part of non-diversifiable risk or risk that cannot be eliminated through diversification.

It is paramount for investors to know the impact of systematic risk, thus being able to make a rational decision with immense knowledge of the systematic risk. There are several reasons why understanding systematic risk is quite critical, as depicted below:

Firstly, the magnitude of its complexity makes it exceedingly difficult to plan on it. Since it does not work in isolation it is difficult to track it and have ways of how to mitigate this risk.

Also, the derivation of this risk is mostly out of the control of the investor which makes it become a “state of nature” as a component of the decision-making process. With its interrelation and correlation to the market index by attached to vast factors that are associated with market risk, interest risk, and inflation risk, exchange risk, credit risk, etc.

Secondly, systematic risk cannot be eliminated through diversification as opposed to unsystematic risk that can be eliminated through diversification.

This implies that in the process of making the decision the investor must strategically impose optional strategies that can excel well in the prevailing systematic risk otherwise it influences the variation of returns while the investor has the option of investment.

Unlike systematic risk, unsystematic risk is known as a diversifiable risk; residual risk, specific risk; this is due to the factors that it can be minimized through diversification because it is mostly self-imposed (Harry M. Markowitz, 2016). Hence to due to its nature of background, it also implies that unsystematic risk is internal, with the common instances being:

The business risk could be due to poor policy implementation and effectiveness.

Financial risk: is the alternation and mix of capital structure with its related impact on the company financing and operations programs. Operational risk: management's and employees' attitudes towards the company: may either hamper the entity's performance or improve it hence it is through its policies and upholding of entities values and principles that mitigate the risk.

Unsystematic risk can be eliminated through diversification. This can be depicted in statistical analysis of insightful review on the covariance and correlation. The assets that pull the risk in a different direction are always preferred as diversifiable securities rather than an asset that pulls the risk in the same direction. That is to say, the measurement of risk is reflected through the risk of an individual asset. For example, companies with higher volatility and more sensitivity are expected to have greater beta co-efficient than that of the expected market beta which is usually benchmarked at 1 (Keith K. Reilly & Calvin Brown, 2010).

**Risk measurement**

Risk assessment is a statistical inference to both subjective and empirical data. That is incorporated to measure the deviation of several returns around the expected returns. With the application of central tendency and relative measure, measures of dispersion infused into computation concepts such as variance, standard deviation, and co-efficient variation. The computational of the dispersions through variances is attached to the statistical data as follows;

$$\delta^2 = \sum_{i=1}^n \frac{(R - \bar{R})^2}{n}$$

$$\delta^2 = \sum_{i=1}^n ((R - \bar{R})^2 p_i$$

Where;

**$\delta^2$  Is the variance of the series** **R is the return of various outcome**  
 **$\bar{R}$  is the expected return or the average** **n is the number of observation**

Variance is squared units, to revert -back to the original figures: then we need to apply square root to the variances to go back to the original units. This can be calculated as follows:

**$\delta$  =  $\sqrt{\sum_{i=1}^n (R - \bar{R})^2 p_i}$  : Where;**

**$\delta^2$  Is the variance of the series ,  $\bar{R}$  is the expected return or the average**  
**R is the return of various outcome  $p_i$  is the probability associated with each outcome**

**Expected rate of return**

Expected returns can be what investors are projecting they will get from an investment. It can be computed using various approach such depicted in subsection below:

. Expected return using – capital gain yields:

We can use the return measurement through the historical changes which is the return by using the capital invested at the initial state and the prevailing of the current of that capital let say, the current capital and dividends that has been associate with the capital movements.

$$ER = \frac{P_1 - P_0 + D_1}{P_0} \quad \text{Where: } P_1 = \text{capital at the end } P_0 = \text{capital at the beginning}$$

**D<sub>1</sub> = Dividend for the period ER = Expected Returns**

For instance, an investor bought a share at Frw.1200 and after one month the shares are now valued at Frw.1500 with dividends of Frw.100. So, the expected return at the period of one month would like to be;

$$ER = \frac{1500 - 1200 + 100}{1200} = 33.33\%$$

Hence, the equity holder will receive 33.33% of the amount invested.

Expected return (ex- ante return) –Probability distribution:

It is a central tendency measure and probability distribution: that can be applied to an investor’s future return to obtain a summarized analysis. Various techniques could be used such as expected values, arithmetic means, etc.

Since in most cases, risk can be expressed as a probability then to do these investors need to assign the probability value to all returns. The probability was computed based on the historical performance or similar investment simulated towards the investors’ expectation in the future (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown & William Goetzman, 2013). The expected return arithmetic can be expressed as follows:

$$\text{Expected return (er)} = \sum_{i=1}^n (\text{probability of return}) * (\text{possible return})$$

For instance, analyses the scenario which can be used to express the above into practical scenario.

**Table 2-1: Probability distribution and it is associated return**

Economic state	Probability	Return
Boom	0.3	30%
steady	0.4	25%
Recession	0.3	-2%
	1	

The expected return was computed as follows:

$$0.3*30\% + 0.4*25 - 2*0.3 = 18.4\%$$

With scenario, being an environment, which is risky statistically: “economic turbulence and variability which is expressed as probability.” Hence the expected return is at 18.4 %.

**Required rate of return**

The minimum required return is the least amount that an investment should be able to make. To sustain the desires of its capital providers minimum required return should generated from financial securities (Keith K. Reilly, Calvin Brown, 2010). This is further defined: as the minimum return that you are supposed to pay your investors for using their capital. (Reilly & Brown, 2009). The complexity of ascertaining the required rate of return is due to its components are influence by market variability and turbulence over time as depicted further as follows;

Firstly, returns of assets are frequently changed due to market rates variability. Secondly, the opportunity cost and the variability of interest and selection of other investment creates the complexity on the returns. The third aspect is that the deviation of the set assets is also subjected to changes over time, so it is quite challenging to set the specific base for an underlying asset.

In general, the essence of the required rate of return is that it is a measure of the excess turbulence and variability which is premium, and it is co-efficient being measured by the beta of formulation.

$$\text{cost of equity} = R_F + \beta_E (R_M - R_F) \text{ " using capm"}$$

Where: **R<sub>F</sub> = risk free β<sub>E</sub> = beta equity β<sub>E</sub> = Market risk**

**Relationship between risk and return**

As previously discussed, it is now possible to be able to differentiate with clarity the difference between risk and returns. Even more so we know how to classify returns into various sets and the meaning to various stakeholders.

The higher the risk the higher the returns anticipated as enshrined in the financial principle of every investor's mindset to compensate for higher risk. The analysis of the security can be done using the security market line which depicts the relationship between the returns and risk.

The movement of risk along the security market line (SML) is explained through the increase and decrease in an individual security. The combination of risk and returns shows the demonstration of various alternation of financial securities. This influences the investor's decisions concerning their attitudes and risk preferences.

The risk and returns relationship depict the movement along with each combination of financial security in portfolio management and the alternative options that an investor has.

### **Risk management in emerging economies**

Risk management in emerging economies is essential for business to be able to excel. The management of risk starts at the inception of planning stages, asset selection stages, allocation stages and hence management of its operation to achieve the intended goals. These depict the channel into which risk management manifests itself.

### **Asset selection and allocation in essence of risk management**

Emerging nations have a way of selecting and allocation of resources: the commonly used projection that is affiliated to performance ratios. Most of which do not reflect the risk associated with the project. However, in cases where the use appraisal techniques such discounted methods, then the CAPM concept which is required is heavily borrowed from developed economies and used. The impact of CAPM concept that heavy borrowed is that it does not reflect the dynamic and specific risks that are aligned to emerging economies.

### **Critical review and research gap**

The risk and returns have been paramount issues and yardsticks to measuring performance hence how it affects the capital budgeting decision. This has resulted in questions relating to risk management with the objective of the maximization of returns. Prior research has been carried out, showing the connection between risk and returns and the possibility of mitigating the risk through various strategy ways. However, this has been limited to developed countries with little being done on the Rwanda stock exchange. Africa has been on the trend as the hub of business which escalates into the myriad of questions that relate to investment decision and risk associated with investing in Africa and its return. There is no doubt that risk is a major part of the breakdown of the process of making the decision, hence the management of risk is the answer to the risky nature of investment in Rwanda stock exchange. The variables that influence the risk and its mitigation are dynamic subject to different fiscal policy, structural formation, and uncertainty of the unforeseeable future that affect the Rwanda stock exchange. The essence of this is to uncover the underlying issues. Although the existence of CAPM has been there since immemorial times quotes and quotes have been "the virtues of modern portfolio theory are taught at every business across the country. The reality is that the investment world as we know it is changing. Even what has worked in the past may not continue to work in future" according to (Mathew P. Erickson, 2019). Another mechanism that could be applicable in risk management that is unconventional, as the price of money starts to be going up, asset allocation decisions was pivotal in appraising how to allocate the assets as also depicted in the concept of (Henril Lumholdt, 2018).

### **Theoretical framework**

#### **Stakeholder theory**

Stakeholder theory is the view that the only duty of a corporation is to maximize the profits accruing to its shareholders (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown & William Goetzman, 2013), This is the traditional view of the purpose of a corporation since many people buy shares in company strictly to earn a maximum return on their funds (Harry M. Markowitz, 2016). If a company were to do anything not associated with returns (earnings). The shareholders would either attempt to remove the board of directors or would sell their shares. Hence use the funds to buy shares in some other company that is more committed to earning a profit (Jordan, 1995). Under the shareholder's theory, the only reason management has delegated the roles and responsibility on behalf of shareholders is to deliver maximum returns to them, either in the form of dividends or an increased share price. (Keith K. Reilly & Calvin Brown, 2010). Hence, managers have significant value.

To divulge into these concepts one step further, a corporation should not engage in any type of philanthropy, since that is not its purpose (Harry M. Markowitz, 2016).

Instead, the corporation can deliver dividends to its shareholders, who then have the option to donate the money for philanthropy purposes, if they choose to do so. (Keith K. Reilly & Calvin Brown, 2010). The only case in which a corporation should be in a comfortable position to donate is when the donation creates the equivalent or greater than the approximate amount donated (Pandey, 2010).

When the company has less incapacity to finance, implying it is not stable to sustain other side financial commitments then is it better to indulge in its internal affairs. A corporation that has fewer shareholders and finance may not support philanthropy. If it does so, it might not meet its goals and objectives which are the maximization of wealth and in the process minimization of risk.

### **Prospect theory**

The theory can also be known as the loss aversion theory. It states that people's perceptions of gains and losses are skewed (Walker, 2013). Until the end of the 1970s, irrational behavior was believed to be unsuited for modeling. The normative expected utility model was taken to be the best approximation of descriptive behavior (Arrow 1951, Tvesky and Kahneman 1981). The theory has been improved by Tvesky and Kahneman (1992). As per financial aspects, it is depicted concisely as that people are more afraid of loss than they are encouraged by gain. If people were to pick between different prospects, they will pick the one that has less chance of ending in a loss, rather than the one which offers most of the gains. For example, if you offer an investor two options depicted as follows, one has a return of 5 % gain each year for let us say a period of three years, and one which has a return of 12.5% gain, 3.5 loss, and 6% return.

The investor is likely to pick the one that has 5% each year than the one which has the loss of a single of 3.5% since the investor will put irrational efforts on the loss of that single ignoring the gains that are of greater magnitude. The aspect of the perceived way of thinking is important for financial professionals and investors as reflected by Walker (2013). Although the risk /rewards trade-off gives a clear picture of the risk an investor must take to achieve desired returns.

Prospect theory tells us that very few people understand emotionally what they realize intellectually. (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown, William Goetzman, 2013). For financial professionals, the challenge is in suiting a portfolio to a client's risk profile, rather than reward desires. For investors, the challenge is to overcome the disappointing prediction of prospect theory and become brave enough to get the returns you want.

### **Uncertainty concept theory**

As stated by the uncertainty environment is the way of life and an investment that is subjected to variant parameters. As concurred by knight (1921 in Herman's et al.,2012) potentially we can differentiate between risk and uncertainty. Following ardent scholars who have been able to define risk, the definition of risk is "it is an environment where decision-making is faced with various outcomes and the probability of occurrence is known" (Adams, 2005 in Herman, 2012). Hence the sense that uncertainty would unquantifiable and incalculable whereas the risk would be deduced in calculation and formulae-wise;  $\text{risk} = \text{chance} * \text{effect}$  (Herman ,2012)

Uncertainty can be perceived as the depiction of various outcomes that are encircling the risk or put it in another way that uncertainty is the range of results from the occurrence of the risk event. The uncertainty as mentioned by Binmore, (2009) the archetypal case of uncertainty is betting at the racetrack when there is no sense to attribute a probability to such a one-off occurrence.

With the review of uncertainty under management risk, we observe some of the dynamic forms of uncertainty. A various instance such as Franks (1999), in Van Stavern 2009), discriminates "aleatory uncertainty" from "epistemic uncertainty". The further depiction of the aleatory uncertainty would refer to variations and change, while epistemic uncertainty would address the lack of knowledge.

As mentioned by (Vaughn ,1997), a different individual under identical environment and conditions would perceive uncertainty differently hence the uncertainty variations are defined by individuals' attitudes towards risk (Slovic, Monahan and Mac Gregor ,2000).

During all these perceived ideas risk is subjective about different individuals and their attitudes define the course of the distinctive paths of the view towards risk. In the literature, for instance, we might find multiple conceptions of risk (Slovic, 1987), and some of them might be even competing (Douglas and Wildsky 1982, Shrader –Frechette 1991).

Disputes and contractions about the perceived attitudes of a risk-taker, risk-averse, and risk-neutral form the basis of understanding the uncertainty connection to risk. Moreover, competing conceptions would not only differ in their definitions of risk but also philosophical ones that are longstanding and systematically linked (Rosa, 1998).

### **Concepts of risk**

Risk can be defined as the variant outcomes away from the expected outcomes (Keith K. Reilly, Calvin Brown, 2010), risk has also been defined in several ways, which are rarely entirely true or false, but useful tools and creating common focal point (Rosa ,1998 in Habbegger ,2008). Risk can also be defined as perceived by the dictionary as a chance of injury, damage, or loss. Following that perceptive risk would not be predestined, but subject to human agency (Habbeger,2008).

The risk may be perceived in a different light concerning the environment that one operates in technical and non-technical aspects. Therefore, in a technical context, the concepts of risk could range in various disciplines such as the “the probability of,” “cause of,” “event that may occur or not occur” to decision alternative under condition probabilities. (Keith K. Reilly, Calvin Brown, 2010) added to this conception the element of uncertainty, by defining risk as a situation or event where something of human value (including themselves) is at stake and where the outcome is uncertain.

Similarly, Terje and Ortwin (2009) consider that although there wouldn't be an agreed general definition of risk in literature, there might be some common characteristics that we can mention: risk equals the expected disutility (Campbell, 2005), risk equal to expected loss (Willis, 2007), the risk is the spread of various outcome away from the investor expected returns (Pandey, 2005). Risk can further be classified under the two formations based on the variables and causers of the risk: as the risk that is from within the control of an entity is the unsystematic and risk that is out of control of the entity is the systematic risk (Keith K. Reilly, Calvin Brown, 2010).

### **Conceptual framework:**

CAPM is a suitable model despite all its limitations of CAPM. It is also a preferred concept for risk assessment and pricing of financial securities. CAPM gives more details on risk and returns statistically. Various variables are related to CAPM and its effects on performance in portfolio, especially in Rwanda stock exchange. The relationship between the parameters involved in the concept of risk and returns as depicted and visualized as follow:

The conceptual framework in the above relates to the variables in the adaptability of the CAPM in Rwanda stock exchange and risk management. The Rwanda stock exchange and its affiliates simulate related issues of the emerging economies (Kristofik, 2010). As portrayed above developing economies are a subject myriad of risks which models like CAPM may be applied to give a more in-depth statistical analysis of risk management; Rwanda stock exchange are prone to detractions and risks that are mainly beyond investors control, namely: political, economically, socially, technologically, ecologically, and legally which in turn affects the diversification of financial securities in portfolio management.

The market portfolio is instrumental in portfolio management, especially CAPM which derives its model variable factors from market sensitivity.

### **Risk -free and premium returns**

The CAPM concept is on the aspects of return versus risk. Where the risk in CAPM has two main components; risk-free and risk premium. Risk-free is defined as the return is realized by underlying security at the point of significant certainty or predetermine return. Examples are government security, treasury bonds: which have the highest surety of being certain following (Harry Markowitz, G peter Todd, et al, 2 May 2008).

The premium is the excess on the risk-free rate that the market return will compensate for a security that is sensitive to the market. The premium risk is the movement of security above or below the return of the market. The sensitivity of financial security is deduced and formulated by beta co-efficient (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown, William Goetzman, 2103).

### **Expected return and premium return.**

The expected return is the Statistical analysis of all outcomes with their associated probability distribution. Statistically, we can be deduced into a spread of information into the risk and returns summaries: (William et al, 2006). The expected return is the mean and the average (Keith K. Reilly, Calvin Brown, 2010). The risk premium is a function of a required return. It is used as a CAPM concept to assess the risk associated with the underlying security. The performance of the portfolio is an application to the aspect that is related to Jensen's measure. The alpha values are the difference between the expected return and required return, using Jensen's measure. Alpha values are the values above or below the expected return and risk return. (Edwin J. Elton, Martin J. Gruber, Stephen J. Brown, William Goetzman, 2013).

### **Market risk and risk premium**

The market risk and risk premium are functions of the CAPM; they are the essence of measuring risk as to the basis of CAPM formulation (Keith K. Reilly, Calvin Brown, 2010). The market risk is how the security moves up and down due to the market variabilities. The sensitivity is measure arithmetically using beta sensitivity (Harry Markowitz, G peter Todd, 2 May 2008). The beta coefficient is to interpret the degree of how sensitive underlying security is: (Harry M. Markowitz, 2016)

The beta coefficient above one is riskier than the beta coefficient that is less than one. The beta coefficient of a risk-free rate is zero as it does not change with the market changes. However, the beta coefficient equal to one indicates that it is market risk.

Premium risk is the excess above or below risk-free.

Those investments will be subdued to market sensitivity: above or below the risk-free rate is affected by the beta changes concerning how it changes the market return. (Jeffrey C. Heisler, Christopher D. Piro, Scott D. Stewart., 2019).

**Summary**

The essence of this was to discuss the overview of portfolio management about CAPM in terms of risk management, with a review of the effects of CAPM as mentioned in emerging economies and the importance of the perception of other financial researchers who were able to approve validation of CAPM in cost estimation is undisputed. Hence also show that CAPM is applied in the developed economies.

In the assessment of risk management: it implies that Rwanda stock exchange are also not an exception to the risk management concept concerning CAPM concept as a portfolio management aspect. Rwanda has a pool of upcoming companies although still young it is never too young to know how to make a rational decision especially with adequate knowledge from portfolio management.

**III. RESEARCH METHODOLOGY**

**Introduction**

This chapter describes the methodology and approach that is the framework for the study. The framework, used in the retrieval of data and information. The essence of this methodology is to design ways of getting more data and information. These guided the researcher in developing instruments to be used in data collection, that are reliable. This chapter covers design, population under the review, sample design, data capturing techniques, and data analysis techniques.

**Research design**

The methodologies were structured: to uncover answers to a broad cross-section of scenarios, where data was collected from respondents only once and only compared with other available records. The proposal is centered on both qualitative and quantitative methods to facilitate a comprehensive investigation.

However, there was more emphasis on the latter as the research is quantitative and descriptive. Sufficient, reliable, and efficient approaches were upheld in –order to complement the features of qualitative approaches through the effects of interviews, websites (internet), documentary reviews, and observation.

This approach is recommended by statisticians and researchers (Amin, 2005) soliciting people's vital and related information is paramount. Quantitative approaches involved the use of descriptive statistics generated and presented in the tabulation format. Since the study is more arithmetical, enormous quantitative data was required to have a significance of the related outcomes. According to (Meyers, 2006, p. 11), testing statistical procedure and process (e.g.

Pearson r, or Fisher ratio of given value) is based on the probability of obtaining a particular outcome. Hence the use of first-hand data is vital from the substantial number of respondents drawn from different selections of the survey population.

The details associated with this chapter are to depict the involvement of the instruments that were used to gather information on CAPM and its effects in the Rwanda stock exchange with the case study being the RSE and its affiliates.

**Target Population**

The study targeted employees working in RSE and its affiliate broker and consultancy. These included financial analysts, financial and international economists, personal financial advisors, and stockbrokers. The nature of the engagement towards then RSE was vital to the statistical information required. Since most of its activities are in the capital city, the sample size was easily accessible.

However, the sampling was applied: since it was a challenge to gather feedback from the population, a significant value of the sample size gave unbiased information. A targeted population size: 112 from the pool of various designated personnel with the probability of confidence interval at 95% or 5% significance level.

**Sample Design**

The study used a sampling technique associated with stratified and purposive sampling to collect the data. Respondents were sub-divided (strata) based on the position and nature of their work. Because there are diverse groups of people working; in several entities or organizations but still converge at RSE and its affiliates which has a pool of securities.

**Table 3 -2:Applied sampling procedure**

Categories of employees	Target population	Sampled selected	The technique of sampling used
-------------------------	-------------------	------------------	--------------------------------

Financial analysts	24	20	Purposive and stratified
Financial and international economists	10	8	Purposive and stratified
Financial Advisor	40	36	Purposive and stratified
Stock brokers	60	48	Purposive and stratified
Total	134	112	

Hypothesis and estimation testing analysis is an inference and subjective: (Burns & Grove, 2007). The statistical inference and empirical of the above data at the 95% confidence are as depicted below:

$$n = \frac{N}{1 + N(e)^2}$$

Where: N= Sample size estimates n=sample size extracted from targeted population  
e = errors

$$88 = \frac{112}{1 + 112(0.05)^2}$$

The estimation and hypothesis arithmetic used to determine the sign indicates that the sample confidence interval used was at 95% is 88 at a range of upper limit being 122 and lower limit being 53 i.e ( $53 \leq 88 \leq 122$ ).

The designed range should be able to give the same results from the range of confidence interval of 95% or significance level of 5% at standard deviation of 17.59. This has been arrived at as shown below .

$$\text{Upper limit } 88 + 1.96 * 17.59 = 122$$

$$\text{Lower limit } = 88 - 1.96 * 17.59 = 53$$

### Sample Size

Since the target population is an actionable matter. The research was selectively done; on the targeted population and the integrated and comprehensive outcome. According to (Grinnell and Williams, 2019): the population is the total of objects subject to the study. The sample is from a population of 112.

The sampled number involved the following: 20 respondents as financial analysts; 8 respondents are financial; international economists; 36 respondents are personal financial advisors finally 48 respondents are stockbrokers at the RSE and its affiliates.

### Sampling Techniques

The study used both discrete and continuous random variables to collect the data. To group the respondents based on their attachment to with entity: stratified and purposive sampling was applied. The research had targeted information from specific targets, where purposive sampling to collect data from specified individuals in the entities. The researcher was able to trace specified information that was relevant to this study.

The retrieval of data was done by techniques such as interviews, questionnaires, and documentary sources. The researcher used designed layout questionnaires to collect the information and data from participants.

The questionnaire was the most appropriate technique to tap information that relates to the objectives of the study. Interview to obtain relevant required data from the personnel respondents such as the managers.

To collect data needed for this study, the researcher applied secondary data, particularly from financial reports and other relevant documentation. Also, the researcher used other secondary data whereby documentary sources such as; textbooks, magazines, academic journals; archival records; reports, other students' dissertations, and internet sources to extend more knowledge about this study.

### Data collection methods

#### Primary data

The primary data was collected using the questionnaire designed as seen in appendix 1 and while engaging the key personnel of the RSE (Rwanda stock exchange) and its affiliates.

#### Secondary data

Different; textbooks, newspapers, journals, articles, Rwanda stock exchange manuals, audited reports, and internet sources. The volume of books and the internet were significant to research information; not to mention, the internet was vital to access the online materials that were in abundance to the research and other related information.

### Data collection instruments

The Research instrument which were involved in the collection of the data were the questionnaire and other related way such as one on one engagements as for the primary data while secondary the use journals, spread sheets related models such the excel, python, visual based analysis, documentaries, R- studio and business channels like Bloomberg channel and other instruments were used to gather the information. The questionnaire is attached as an appendix and letter for consultancy requested information is attached to the appendix.

### Administration of Data Collection Instruments

After the layout of the data manipulation tools, the researcher collected the letter of introduction from Mount Kenya University. This letter was issued to seek permission from the targeted institution for data collection. The researcher wrote a letter, seeking permission to collect the data from the organization.

### Reliability and Validity

Reliability was measured applying the pre-testing methods; the researcher tested the instruments before the effects. Questions were on point and reliable. The questions were relevancy, reliability, and efficiency. Hence, the quality had been guaranteed and consistency maintained. Reliability is the statistical measure of the variables' logical relationship and the degree of the relation:(Trochim, 2015). The aspects of reliability are; qualitative and quantitative, as per :(Trochim, 2015); given more insight into the correlation of validity is viewed in both angles; internal and external variables.

The reliability test was successful and sensible; through repeated activities. They were consistently giving similar outcomes, then the essence of reliability is secured to a certain degree.

The data collection was through applying reliable sources, experimental tests conducted on the estimation and hypothesis verified that the data collected was reliable. The probability was 95%. The data collected was at the RSE and its affiliates' source at security exchange which is the epitome of risk and returns.

### Data analysis Procedures

Quantitative and qualitative: skills were blended. Descriptive statistics; we are used to summarizing the data seen in chapter 4 on research finds. The researcher applied: tables, frequency distribution, percentages, and Cross tabulations; for variables that have close associations such as financial skills and gender, financial training, and experiences. Coding and abbreviation were applied to stratify some of the variables: of the same characters together. Qualitative data was to enhance the quality

### Ethical Considerations

Ethical and professional conduct in the process of doing the research was upheld. (Burns and Grove, 2007). Therefore, before and after conducting the study, ethical issues should be checked and upheld. The financial and administration faculty for approval. Participants' views were kept in safe custody whereby, with the highest level of confidentiality and anonymity. Furthermore, the researcher ensured that the correspondents were aware of the purpose of the research through providing relevant information from Mount Kenya University and Rwanda stock exchange. The participants raised the opinion and suggestion freely and with unequivocal permission.

## IV. FINDINGS AND DISCUSSIONS

### Introduction

The chapter deals with the finding and interpretation. The application of methodologies resulted in answers to the questions. Chapter one has enlisted the research question that relates to the findings. To uncover the presence of risk and its impacts on returns with knowledge of CAPM effects in portfolio performance in emerging countries.

### Demographic

Table 4-3 shows the sample size that was settled on in the process of collection of data which was used as basis of ascertaining the information.

**Table 4-3: Age analysis**

Age	Frequency	Percent
21-30 years	24	30.0
31-40 years	18	22.5
41-50 years	22	27.5
above 50 years	16	20.0
Total	80	100.0

Table 4-3 above shows that 30 % of the respondents are aged between 21-30 years, 22.5% of them are aged between 31-40 years, 27.5 % of the respondents have an age varying between 41-50 years and 20% of them have age above 50 years.

This demonstrates that personnel working in Rwanda Stock exchange notably in management, finance, and stock exchange brokers writers and underwriters who are huge in experience to be able to articulate the essence of cost estimation about the conceptual framework of CAPM.

As depicted additional in the table 4-1 above shows data and information of the personnel who are indulging in the procedure of ascertaining the flexibility of using CAPM in cost estimation are between 21 -50 years also complement with the above 50 who have a more immense group of experience.

**Table 4-4: Gender Frequencies**

Gender	Frequency	Percent
Male	50	62.5
Female	30	37.5
Total	80	100

Table 4-4 above shows that 62.5% were male while the compliment percentage of 37.5 % was female personnel.

**Table 4-5: Experience**

Experience	Frequency	Percent (%)
Less than 2 years	4	5
2-5 years	10	12.5
5- 10 years	34	42.5
More than 10 years	32	40
Total	80	100

Table 4-5 above shows the number of experiences of those personnel engaged in the process. As depicted 42.5 % had an experience of between five years to ten years from various areas of their specialization while 40% of them had of above ten years with a small percentage of 12.5 being with experience of two to five years and 5 % below 2 years.

**Presentation of the findings.**

**Examine how portfolio performance and the CAPM are related**

The finding showed that CAPM as tool uses in capital budgeting decisions is used but an imposed CAPM that is computed by developed countries and not locally computed.

**Table 4 -6: portfolio performance and CAPM are related .**

Status	Responses	frequency	Percent
Those who said	No	20	25%
Those who said	Yes	60	75%
Total		80	100%

The above table 4-6 shows the reaction towards this question which is either a yes or no answer.

The reaction of the workers as to whether they have ever used CAPM as a cost estimation measure was 25% of the respondents said “No” that the introduction of CAPM is more technical and tedious. While those who agreed, with “yes” as the answer concurred that the CAPM that is used is borrowed from developed countries.

**Analyze the market portfolio's effectiveness**

**Table 4 -7 :Market portfolio effectiveness**

Risk management	Responses Frequency	Percent
Asset selection	20	25%
Risk and returns	14	17.5%
Asset allocation	32	40%
Capital budgeting	14	17.5%
Total	80	100%

Table 4-7: above shows: Interpretation: The table shows respondents' preferences for various CAPM (Capital Asset Pricing Model) components in the context of a growing country.

Asset allocation was mentioned the most frequently by 32 (or 40%) of the 80 respondents, showing a considerable role for it in the CAPM. The frequencies for asset selection and capital budgeting were 20 (25%) and 14 (17.5%), respectively. The frequency of risk and reward was 14 (17.5%). According to these results, respondents rank asset allocation as the most important CAPM component, followed by asset selection, capital budgeting, and taking risk and return into account when making investment decisions in the emerging market.

**Evaluate risk-free rate impact on portfolio returns and relevance in CAPM context for estimating performance.**

**Table 4-8: How familiar are you with the Capital Asset Pricing Model (CAPM)**

Reponses	Frequency	Valid Percent
YES	56	70%
NO	24	30%
Total	80	100%

Table 4-8: shows that 70 % were familiar with variables of CAPM. 30 % had an average information about CAPM. The 70% could articulate what is CAPM while 30% had slightly average theoretical knowledge.

**Examine how the correlation coefficient affects the diversity of a portfolio.**

**Table 4 -9: Effects of correlation coefficients on diversification**

Reponses	Frequency	Percent
NO	6	7.5%
YES	74	92.5%
Total	80	100%

Table 4-9 shows the response of the participant trajectory thoughts and aspiration that they would wish that CAPM as a model to be used as basis portfolio management. Interpretation: The respondents' opinions on whether the Capital Asset Pricing Model (CAPM) is applicable are shown in the table. Only 6 (7.5%) of the 80 respondents indicated their conviction in the viability of CAPM by responding "No." However, most respondents, 74 (92.5%), chose "Yes", indicating doubt about the usefulness of CAPM. These findings imply a lack of agreement among respondents regarding the use and efficacy of CAPM in their investment choices.

**Analyze the standard deviation's function in measuring portfolio risk.**

**Table 4 - 10: Reaction on analyze the standard deviation in measuring portfolio risk**

Reponses	Frequency	Percent
No	60	75%
Yes	20	25%
Total	80	100

The above table 4-10: shows the reaction to the standard deviation setup that incorporates risk and returns. Interpretation: The table displays the responses of the respondents regarding the practicability of the Capital Asset Pricing Model (CAPM). Out of the 80 respondents, 60 (75%) answered "Yes", indicating their skepticism about the effects of CAPM. Conversely, 20 respondents (25%) answered "No," suggesting a disbelief in the effect of CAPM on portfolio performance. These results indicate a sizable portion of respondents expressing affirmation regarding the effects of CAPM in their investment decisions.

Figure 4-1: Inter – item correlation matrix

Inter-Item Correlation Matrix													
	Age	Gender	Experience	Investment set up	Identification of risk	Required return assessed by CAPM	Risk management	Asset allocation	Assets selection	Diversification	Risk avoidance	Nature business	Research and development
Age	1	-0.168	-0.233	0.354	-0.077	0.011	0.049	-0.3	-0.083	-0.035	0.043	-0.018	-0.054
Gender	-0.168	1	-0.163	0.152	0.137	0.025	0.07	0.015	0.055	-0.081	-0.127	0	-0.078
Experience	-0.233	-0.163	1	-0.157	-0.102	0.174	-0.199	-0.019	-0.105	0.253	-0.139	-0.206	-0.071
Investment set up	0.354	0.152	-0.157	1	0.036	0.045	0.327	-0.378	-0.216	0	-0.13	0	0.041
Identification of risk	-0.077	0.137	-0.102	0.036	1	-0.108	0.197	-0.15	0.261	0.236	0.227	-0.177	-0.114
Required return assessed by CAPM	0.011	0.025	0.174	0.045	-0.108	1	0.18	-0.113	-0.129	-0.089	-0.078	-0.133	-0.021
Risk management	0.049	0.07	-0.199	0.327	0.197	0.18	1	-0.143	0.081	-0.019	0.142	-0.224	-0.076
Asset allocation	-0.3	0.015	-0.019	-0.378	-0.15	-0.113	-0.143	1	-0.126	-0.08	-0.108	0.08	-0.086
Assets selection	-0.083	0.055	-0.105	-0.216	0.261	-0.129	0.081	-0.126	1	0.007	0.71	-0.119	0.263
Diversification	-0.035	-0.081	0.253	0	0.236	-0.089	-0.019	-0.08	0.007	1	-0.085	-0.085	0.034
Risk avoidance	0.043	-0.127	-0.139	-0.13	0.227	-0.078	0.142	-0.108	0.71	-0.085	1	0	0.059
Nature business	-0.018	0	-0.206	0	-0.177	-0.133	-0.224	0.08	-0.119	-0.085	0	1	0.051
Research and development	-0.054	-0.078	-0.071	0.041	-0.114	-0.021	-0.076	-0.086	0.263	0.034	0.059	0.051	1

The inter-item correlation matrix given displays the correlation coefficients between several study variables. The correlations are broken down as follows: Age and Gender: Age and gender have a weakly inverse association (negative correlation, -0.168). Age and Experience: Age and experience have a weakly inverse relationship, as seen by their negative correlation (-0.233). Age and Investment Setup: Age and Investment Set Up have a positive correlation (0.354), which denotes a marginally positive link.

Age and Risk Identification: Age and risk identification have a weakly inverse association (-0.077 negative correlation). Age and the Required Return as Determined by CAPM: Age and the Required Return as Determined by CAPM have a weakly positive association (0.011). Age and risk management: Age and risk management have a positive connection (0.049). Age and asset allocation have a weakly inverse relationship, as seen by their negative correlation (-0.300). Age and Asset Choice: Age and asset choice have a weakly inverse correlation (-0.083), indicating a link.

Age and Business Type: There is a marginally negative connection (-0.018) between age and business type. Age and scientific advancement: Age and scientific advancement have a negative connection (-0.054). Gender and Experience: Gender and experience have a weakly inverse correlation (-0.163), indicating a link. Gender and investment structure: There are a weakly positive association (0.152) between gender and investment structure. Gender and Risk Identification: Gender and risk identification have a weakly positive correlation (0.137), indicating a link.

The relationship between gender and the needed return as determined by CAPM has a weak positive correlation (0.025). Gender and risk management: Gender and risk management have a favorable connection (0.070).

Gender and asset allocation: Gender and asset allocation have a weakly positive connection (0.015). Gender and asset choice: Gender and asset choice have a positive correlation (0.055), showing a positive link. Gender and Diversification: Gender and diversification have a weakly inverse correlation (-0.081), indicating a link. Risk aversion and gender: A slight inverse association between gender and risk aversion is indicated by a negative correlation (-0.127).

Asset allocation and asset selection have a weakly inverse relationship, as seen by their negative correlation (-0.126) between them. Diversification and Asset Allocation: Asset Allocation and Diversification do not significantly correlate. Asset allocation and risk avoidance: Asset allocation and risk avoidance do not significantly correlate. Asset allocation and firm Nature: There is a weakly positive connection (0.080) between asset allocation and the nature of the firm.

Asset allocation and research and development have a weakly inverse relationship, as seen by the negative correlation (-0.086) between the two variables. Selection of Assets and Diversification: There is a weakly

positive connection (0.007) between selection of Assets and diversification. Investment setup and risk identification: These two factors have a weakly positive correlation (0.036) that suggests a relationship exists between them.

**Reliability test: The test of independence: Chi square test**

Recall the general research hypothesizes:

Hypothesis 0: Effects of CAPM is not significant in portfolio performance management

Hypothesis 1: Effects of CAPM is significant in portfolio performance management

For the following question, the hypotheses are the following:

Ho: The reliability of cost estimation is independent to the effects of CAPM

H<sub>1</sub>: The reliability of cost estimation in risk management and CAPM is dependent.

**Table 4 - 11: Results of the Chi-Square Test for the effects of CAPM on portfolio performace**

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.500a	24	0.998
Likelihood Ratio	4.043	24	0.983
Linear-by-Linear Association	1.96	1	0.162
N of Valid Cases	80		
a. 19 cells (95.0%) have expected count less than 5. The minimum expected count is .05.			

The interpretation of table 4-23: Independency the non-parametric variable: The test of independence does not produce statistically significant findings based on the information from the Chi-Square testing that was provided. The Pearson Chi-Square test has a p-value of 0.998, which is higher than the usual significance level of 0.05. The p-value for the Likelihood Ratio test is 0.983, which is likewise higher than the 0.05 cutoff. These findings suggest that there is no meaningful relationship or dependence between the use of CAPM and the accuracy of cost estimation.

Given this result, we are unable to rule out the null hypothesis (Ho), according to which the use of CAPM has no effect on the accuracy of cost estimation. In other words, there is no evidence to support the idea that using CAPM will increase the accuracy of cost estimation in risk management.

**Table 4 -12: Independence test between adoptions of CAPM and Asset selection**

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.925a	12	0.021
Likelihood Ratio	8.396	12	0.21
Linear-by-Linear Association	0.136	1	0.712
N of Valid Cases	40		
a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .05.			

The interpretation of table 4-24: The Pearson Chi-Square test produces a significant result based on the data from the Chi-Square tests that were presented. The test's p-value is 0.021, which is lower than the usual significance threshold of 0.05. This implies that there is evidence to reject the null hypothesis (Ho) and draw the conclusion that the variables under study have a meaningful correlation or relationship.

The Likelihood Ratio test, on the other hand, produces a non-significant result with a p-value of 0.21. This shows that the data are insufficient to use this test to reject the null hypothesis.

By comparing two ordinal variables, the Linear-by-Linear Association test looks for associations between them. With a p-value of 0.712, the test in this instance does not produce a statistically significant result.

Based on the data from the Chi-Square tests that were conducted, the Pearson Chi-Square test yields a significant result. The p-value for the test is 0.021, which is less than the customary 0.05 level of significance. By doing so: it is implied that there is sufficient data to reject the null hypothesis (Ho) and conclude that the variables under investigation are meaningfully correlated or related.

On the other hand, the Likelihood Ratio test yields a non-significant result with a p-value of 0.21. This demonstrates that there is not enough data to reject the null hypothesis using this test.

The Linear-by-Linear Association test examines connections between two ordinal variables by comparing them. The test in this case does not yield a statistically significant result with a p-value of 0.712.

## V. CONCLUSIONS

### **Introduction**

The capital asset pricing model (CAPM); is the most appealing technique of risk and returns assessment: despite its assumptions and limitations, CAPM must be given the utmost reliability as a measure of cost estimation. As per this: chapter 5 conclusion, recommendations, suggestions the essence is to narrow down to the final assessment and results are supported with interpretations as seen in Chapter 4 data analysis, presentation, interpretation of findings.

### **Summary of findings**

CPAM face a myriad of challenges in emerging economies hence making it irrelevant aspects of measuring cost, this is due to the following reason;

### **Investment set up and investment decision**

The market efficiency in the emerging economies is of weak- form of efficiency with some inclination towards the semi-strong efficiency. Also, the market information is not reliable to capture the trend of movement, hence, to be able to measure the covariance and correlation co-efficiency which are a function of how sensitive security is as ascertained by beta co-efficient.

Most of the emerging economies are attached to the developed world, hence the nature of business here is influenced by developed economies of foreign impact. Compromises the sovereignty of having reliable data independence.

The investment setup is the key player in the role of manipulation of the information of data and trends most emerging economies have attached ties to such risk. The orthodox way of traditional techniques has for many years been perceived as a better approach, but the practice has an array of pitfalls making it unreliable to

the ever-changing times and globalization effects that must overshadow such approaches and put them on spot as a sham, vague, and spurious as they lack logic and hence fail to even stand a chance on reliability test.

### **Assessment of asset selection**

The parameters and variables involved in asset selection are unreliable as they did not depict any critical analysis to reflect that risk and returns were used in the process.

The asset selection was merely based on intuition and not on critical data. Which is turn into information statistically, analysis, and evaluation.

### **Assessment of asset allocation**

With those pitfalls mentioned above orthodox way, the traditional approach is not reliable as CAPM, which is more critical than the fallacy of intuition that tradition stands for. However, many would wish to incorporate CAPM but have difficulties in understanding how to diversify the portfolios.

### **CAPM as risk management tool**

The first problem of effects CAPM is a function of the beta estimation. Traded underlying securities are the main focal point of information as they display the movement about the market is easily traceable and trailed in developed countries. However, in emerging economies: the procedure is tedious and vague since then trade security has a brief history to trail on, illiquidity of money market, low occurrence of frequency of traded security, and few numbers of listed companies.

This problem can be resolved through well-structured systems. The review was to incorporate the variables connected to emerging economics since they are unique. These can give standards to the financial proponents; weights, cash-flow, also relate to the level of liquidity as per the stock exchange.

Beta ascertainment for emerging economies can be modeled on specific levels and reflected on the re-adjusted beta equity and assets. Hence, investors can define the risk assessment that the Rwanda stock exchange are likely to infuse with the modified beta and be more informed on various corporate finance decisions that may be acceptable or reject-able.

Asset allocation is an enormous task, secondly, asset selection as it is independent and interrelated. The way to mitigate its hindrance is to incorporate various experimental trading factors that can give an index that moves along with the changes. Hence which will be able to verify the asset selection impact. However, this can be through the interest parity between various currency turbulence and volatility.

Asset allocation has affected the flow of information. Decision-making is heavily influenced by information availability. With the enhanced flow of information, investors are likely to make well-structured financial decisions. To reflect efficiency at RSE and it is affiliated may need a more advanced information platform that makes it possible to get the information they can use to measure beta movement. Research and development can bring out a tailored-made way of harnessing required data. As priory mentions, the gap between

theoretical CAPM and practical CAMP can be close through research and development and incorporation of CAPM concepts in the corporate finance world.

### **Recommendations**

Finally, to conclude this, CAPM is not a panacea per se, has limitations and assumptions that have been the subject of debate it is better in comparison to the traditional way. Traditional methods have no framework and are vague and are more realistic as compared to nothing or another fallacy model.

### **Suggestions for further study**

The incorporation of CAPM is more of value to the emerging economy. As an individual who has indulged in business valuation. I realized that investors want more information on risk and returns, which were more hypothetical and borrowed from the developed countries. CAPM is relevant and can be modified to suit the emerging economies' structure. Structure of market efficiency, economics, and others should be developed to enhance the risk and returns assessment to give in investor's ideal information on where to invest and how to maximize the objectives.

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