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Interaction of Complex Investment Constraints and Diversification on Portfolio Efficiency in the Soft Drink Industry in Western Kenya

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Abstract
Harry Markowitz (1952, 1959) portfolio problem reveals that assets cannot be selected only on characteristics that are unique to them. Past studies on diversification focused on the "extent" of diversification. The purpose of this study was on the interaction of complex investment constraints and diversification on portfolio efficiency in the soft drink industry in western Kenya. The study was a descriptive survey design with a target population of 250 respondents selected by a census sampling technique. Both primary and secondary data were used in this study; an interview schedule was used whose reliability was provided using Cronbach's Alpha; the results of analysis found Cronbach's Alpha of 0.970 which suggest strong internal consistency of the research instrument compared to its standard of 0.70. Secondary data was obtained from the firm's financial statements relating to firm's assets. Descriptive statistics involved the use of percentages and means, and regression equations to establish the relationship between complex investment constraints, diversification and portfolio efficiency. capital structure as a constraint doesn't have any significant contribution to diversification; level of investment information and level of investment risk significantly contribute to investment diversification; a strong association exists between complex investment constraints and diversification (R = 0.984) and the variation in investment diversification can be accounted for upto 96.7% by firm's capital structure, level of investment information and level of investment risk and with a significant relationship (F= 2428.043, p < 0.005); a positive correlation for the diversification alternatives to portfolio efficiency; worst diversification alternative (0.458**), average diversified alternative (0.713**); and best diversified alternative (0.890**); and this correlation was significant at (p<0.01; 2-tailed. Results indicate a significant relationship between investment alternatives (WDA, ADA, and BDA) and portfolio efficiency (F= 398.020; p 0.000< 0.05*)*. The contribution of diversification alternative towards portfolio efficiency shows that only ADA and BDA have positive contribution while WDA has negative contribution to portfolio efficiency; there exist a significant relationship between ADA, BDA and portfolio efficiency; the results indicate that portfolio efficiency depends on diversification sets constructed by investors; PORT.EFF. = 2.103E-16 – 2.795E-15 WDA+ 0.231ADA + 0.769 BDA; results for part analysis of ADA, BDA and portfolio efficiency show improved performance in portfolio efficiency; the R is 0.911, R^2 is 0.829; and adjusted R^2 has a dismal increase; but the F value increased from 398.020 to 599.45; this indicate that ADA and BDA are better in influencing portfolio efficiency, but BDA is the best model for selection of efficient portfolio (F= 947.112; R= 0.890; R^2= 0.792; p< 0.05).
Keywords: Investment Constraints, Diversification, Portfolio Efficiency, Soft Drink Industry, Kenya

1. Introduction

Harry Markowitz (1952, 1959) formulated the portfolio problem as a choice of the mean and variance of a set of assets; the fundamental principles behind this theory include: holding constant variance while maximizing expected return or holding constant expected return while minimizing variance. The theory reveals that assets cannot be selected only on characteristics that are unique to them, but considered on the basis of how each asset co-moves with all others. Uncertainty influence investment process; as such since 1950's several models have been developed relating to portfolio theory. Mankiw and Shapiro (1986) study stated models that are related to this theory include Capital Asset Pricing Model (CAPM), Inter-temporal Capital Asset Pricing Model (ICAPM), Arbitrage Pricing Theory (APT) and the Consumption oriented Capital Asset Pricing Model (CCAPM). The CAPM model suggests that investments risk premium offered by all capital assets are ranked and despite the fact that the risk premium offered by the market as a whole is not explained; further in the model the forecast on the rates of return do not depend on actual capital asset prices or those in the balance sheets. This scenario limits investors to use the CAPM when comparing different feasible capital market equilibria as they neither explain the risk premium offered by the market as a neither whole nor result in convenient valuation formula. The CCAPM model focused on sensitivity to risk, where the volatility of actual consumption is not consistent with the actual risk premium and therefore an equity premium puzzle arise (Burnside and McCurdy, 1992). Financial analysis and portfolio selection in principle do not rest on such models (Farrel, 1997). It is therefore unclear how valuation errors could be eliminated so as to attain the appropriate capital market equilibrium for appropriate

portfolio selection. Most investors rely on models to project outcomes of their investments; limitations in these models influence portfolio selection and performance.

Firms diversify their operations either across different markets or across multiple lines of business to increase the economy of scale, scope and efficiency (Hitt, 1997). Diversification is an increase in the number of industries a business participates in; it improves debt capacity, reduce chances of firm's bankruptcy, improve asset deployment and profitability of the firm. Most of the studies on diversification are focused on aspects such as the "extent" of diversification less or more diversification, the directions related or unrelated; with little attention in internal expansion or mergers and asset diversification. The effect of diversification on capital structure is not clearly highlighted by scholars; theories tend to explain the diversification effect on capital structure choice in a firm. According to the "Co insurance effect" firms that diversify their activities reduce the risk associated to operating in a single business. The reduced risk thus help firm's to improve their debt capacity. Further according to the transaction cost explanation, firms diversify their activities in response to the existence of under-utilized resources. The agency cost theory affirms that debt financing is a governance device that reduces the conflict of interest between shareholders and managers (Williamson, 1988). The empirical evidence on the diversification and capital structure as a moderator in the interaction between investment appraisal, diversification and efficient portfolio selection is limited.

Alonso (2003) study on firm diversification after controlling firm characteristics like business risk, growth opportunities, firm size, intangible assets and firm profitability; the study findings revealed no significant relationship between capital structure and the degree of diversification, this contradicts the theory and practice of finance. Singh (2003) confirmed that leverage is positively related to diversification across product lines but negatively to geographic diversification. This study focused on the moderating effect of capital structure, level of investment risk and investment information on interaction between investment appraisals and diversification on efficient portfolio selection. Portfolio selection problem is concerned with determining a portfolio such that its return and risk have a favourable trade-off. The portfolio with highest "likely return" is not necessarily the one with least "uncertainty of return". The most reliable portfolio with an extremely high likely return may be subject to unacceptably high degree of uncertainty; and that with the least uncertainty may have undesirably small "likely return". Between these extremes lie portfolios with varying degrees of likely return and uncertainty (Markowitz, 1959). Mean variance portfolio theory is meant to find the optimum portfolio for an investor who is concerned with return distributions. An investor is assumed to estimate the mean return and variance for return for each asset being considered in the portfolio. The key issues facing firms is how to allocate wealth among alternative assets; the situation is more complicated when the characteristics of their liabilities are included in the analysis. The mean- variance portfolio has a maximum utility function or at least a near optimum expected utility, this situation calls for the optimization of the problem whose solution requires the use of vectors of portfolio weights to indicate the parts of the investor's wealth invested into the selected assets(Kroll et. al,1984).

Markowitz (1952) mathematical model to describe the portfolio selection problem where return and risk are measured by mean and variance; the critical issues in implementing the model are on the calibration to achieve accurate expected returns, risks and correlations among selected investments. Lo and MacKinley (1990), Mech (1993) considered auto- correlated asset returns, the results revealed that conditional distribution of asset returns is no longer a normal distribution. The set of investments forming the portfolio covers a wide range of distributions. The efficient portfolio map forms a class of elliptical contoured distributions like normal, compound normal, the Pearson types II and VII distributions among others (Fang et al, 1990). The simple accept or reject investment decisions may not be a common practice; firms face complex investment situations and must choose among alternatives to form the portfolio set. In choosing mutually exclusive assets with the same lives is basically comparing their net present values and choosing the asset with higher net present value into the investment set or portfolio. However when different lives of assets are involved the use of NPV rule without accounting for the difference in the assets lives may fail to indicate correct choice included in the portfolio set. Further investment timing and duration tend to influence the number of assets included in the portfolio; in the absence of a capital constraint, a firm will undertake all those investments which have positive NPVs while rejecting those with negative NPVs. Further analysis may however indicate profitable assets rejected today if same assets are undertaken in the future. Therefore the constraint of postponable investments may involve two mutually exclusive alternatives and therefore a firm should determine the optimum timing of investment, a constraint critical to portfolio selection and efficiency.

In the seminal work by Markowitz (1952) and Tobin (1958), reveal that every investor is deemed as a price taker; the means and covariance's of the rates of return on available assets are just inputs to portfolio selection. Sharpe (1964), Linter (1965) and Mossin (1966) summarized the normative theory of portfolio selection as appositive theory of capital market equilibrium where capital asset prices become outputs. The investor need to perform a "what if" analysis attaching prices and statistics of the rate of return to any pair of values of the risk free interest rate and price at risk. Unfortunately no direction is available on how investors

forecast on balance sheets can be included within the investments models like CAPM.

As the number of investments increases the standard deviation of a portfolio become a function of these investments (Fama, 1976). The efficient frontier is a set of dominant portfolios, at least from the perspective of a risk averse investor, for any level of risk as the efficient frontier identifies a point with highest return for a portfolio in its risk class. Further a study by Demsetz and Villalonga (2001), asserted that Tobin's Q is a performance indicator that reflects the prospects for the firm's profitability. The communities of investors as represented by Tobin's Q are constrained by the market expectations a situation which disregards the accounting profit rates. This presents a unique scenario as the accounting profit is not affected by the psychology of investors, and it partially involve estimates of future events mainly in the valuation of goodwill and depreciation. Most studies on firms performance measurement use accounting data to compute Return on Assets (ROA) and Return on Equity (ROE) which are constrained by the use of accounting earnings which make them easily and directly affected by the numbers on financial statements. These indicate that measuring business performance by accounting standards may produce biased results. Morck et.al (1988) asserted that Tobin's Q is a good indicator of the discounted value of the future cash flows for it considers the time value of money and the cost of capital. Drury and Tayles (1997) expressed that future cash flows conversion to real cash flows the resulting projected amounts must be deflated by the general rate of inflation. This adjustment of investments cash flows is important and complex process. The correct treatment of inflation requires comparison of like with like in the financial appraisal to facilitate the fact that real cash flows are discounted at real discount rate. This finding indicates that there is a likely potential mismatch of assumptions regarding cash flows and discount rates that may be used in investment appraisal decisions and portfolio selection. The resultant effect is that investments appraisal tools like NPV values are likely to be understated and in some cases contributing to rejection of investments that are viable which otherwise could be in portfolio set. Finnie (1988) observed that firm's are guilty of rejecting worthwhile investments because of improper treatment of inflation in the financial appraisal as one of the investment constraint. The inflation affects both the future cash flows and the cost of capital that is used to discount the projected cash flows on investment proposal.

Past studies indicate that gender is the third most powerful determinant of investing after age and income; women have different attitudes towards money and investing; men take more investment risks, they tend to be detail oriented and understanding of their investments, and are wholistic in their investment process considering every piece of information and relevant factors (Jiankoplos and Bernesek, 1998; Worley,1998). The theory of capital structure and its relationship with a firm's value and performance has been a puzzling issue in corporate finance and accounting literature since the seminal work of Modigliani and Miller (1958). Accordingly a firm's value is determined by its real assets not by the mix of securities it issues. The amount of leverage in a firm's capital affects the agency conflict between managers and shareholders by constraining managers to act more in the interest of shareholders; after managers behaviours and operating decisions which implies that the level of leverage in the capital structure affects firm performance a reflection of its portfolio set (Jensen and Meckling,1976; Haris and Raviv, 1991; Graham and Harvey,2001; Brav et al. 2005). The analysis of the relationship between capital structure choice and firm portfolio performance is very important particularly on the association between debt level and shareholders wealth; since their wealth maximization is the primary objective of firm managers.

Jermias (2008) argue that prior studies examined the effect of financial leverage on firm performance, where leverage performance relationship was contingent on factors like investment appraisal criterion, competitive intensity and business strategy. Zeitun and Tian(2007) examined the relationship between capital structure and performance showing that debt level is negatively related with performance both in accounting and market measures. Abor (2007), examined the relationship between debt policy, capital structure and performance of small and medium sized enterprises, where capital structure particularly long term and total debt level have a negative relationship with firm performance. These studies inadequately explained how these constraints tend to influence portfolio selection and optimal portfolio efficiency as causes to firm's performance; forming the basis of this study. Coca-cola enterprise (CCE) is the world's largest bottler of non alcoholic beverages by volume. It produces, sells and markets beverages using concentrated syrups bought from concentrate manufacturers, utilizing an extensive distribution network to deliver the finished product to consumers. The company has broad investment portfolio and diversification sets; for example, in 2009 Cocacola Company finalized the acquisition of Coca cola enterprises for $12.3 billion (CCE2009, financial report). In Kenya, the carbonated soft drink industry consists of three players these are Coca Cola, Softa and Milly food processors. Coca Cola, of the three players is the market leader with over 96% of the market share (CABI report, April 2002). Coca Cola Company in Kenya has six bottling plants namely: Nairobi Bottlers, Coastal Bottlers, Rift valley Bottlers, Mt. Kenya Bottlers, Equator Bottlers and Kisii Bottlers. The coastal and equator bottlers limited are under the shah family, Nairobi Bottlers limited is owned by South African Bottling Company, while Kisii bottlers limited, Rift valley Bottlers, and Mt. Kenya Bottlers are under Industrial and Commercial Development Corporation (ICDC).

Since the early work of Modigliani and Miller (1958) on capital structure irrelevance there has been considerable study of capital structure and its impact on firm value. Leverage is positively related to fixed assets, non -debt tax shields, investment opportunities and firm size; and is negatively related to volatility, advertising expenditure, and probability of bankruptcy, profitability and uniqueness of the product. Diversified firms need to carry greater leverage to maximize firm value. It is shown that highly diversified firms have less market power in their respective markets than more focused firms (Harris and Raviv, 1991; Li and Li, 1996). Study by Berger and Ofek (1995) compared estimates for the stand alone values of business segments and found a 13-15% value loss from diversification. This loss is less in firms diversified within closely related industries. Lewellen (1971) argued that combining businesses with imperfectly correlated cashflow streams provide a coinsurance effect that creates more capacity for debt. Li and Li (1996) observed that the combination of diversification with low leverage leads to overinvestment. Thus to maximize shareholder wealth, diversified firms may have greater debt capacity than non diversified firms. Results of empirical research are consistent with this proposition, since product diversified firms chose to carry relatively more debt than non-diversified firms. The soft drink industry is product diversified; the robustness of this proposition is questionable because the relation between leverage, investment constraints and diversification does not appear consistent with the performance index in the soft drink industry.

The multi-asset investment theory indicates that portfolio returns is a linear function of asset weights while its volatility is a non- linear function indicating that portfolio volatility is less than a weighted average of individual asset volatility. Despite this, research indicates that portfolios increase in size and their variances increase rather than decreasing for investors with uncorrelated risky assets, this contradicts the portfolio theory. Past studies concentrated on simple accept-or- reject investments decisions with conventional cash flows without taking into account firms with complex investment situations and problems. A combination of investment constraints and diversification on efficient portfolio selection may account for this contradiction to portfolio theory for uncorrelated assets. Further companies that have used this theory for practical investment diversification show a very low profit to total assets ratio indicating dismal performance. Moreover, when comparing Tobin's *q* of diversified firms to the Tobin's *q* of specialized firms, single-industry firms are valued highly than diversified firms, this result cannot be explained by industry effects or concluded that diversification hurts performance.

2. Review of related Literature

Investors adopt investment strategies to realize their investment objectives; optimal investment decision corresponds to expected utility maximization problem. Risk is a subjective concept and even if the desirable features of an investment risk measure are identified, probably no unique risk measure may exists that can be used to sort out every investor's problem (Balzer, 2001). An investor caring on mean and variance of static portfolio returns holds a portfolio on the mean variance efficient frontier as characterised by Markowitz (1952) where optimal performance is possible; however, because of estimation error the resulting portfolio weights fluctuate substantially over time. This has greatly undermined the use of mean variance popularity and managers are reluctant to implement policies that recommend drastic changes in the portfolio composition. Value at risk (VaR) is a key tool for risk management; it provides quantitative and synthetic measures of risk that takes into account the relation existing between asset returns, financial options and level of default risks. In a deterministic appraisal, the investment risk is usually accounted for by including a risk premium in the discount rate for appraising the investment opportunity. The magnitude of this risk premium is basically the difference between expected return required by the investor and the risk free interest rate. The derivation of the risk premium is subjective and arbitrary. Brealy and Myers (1992), argue that the most appropriate discount rate to use in investment appraisal subjected to risk analysis is the risk free rate because any other discount rate prejudices the level of risk in an investment opportunity. The most appropriate discount rate is that involving the application of risk analysis and careful consideration of risk components of the main variables and their relationship on the investment opportunity. Risk analysis presents the investor additional information on risk-return profile of the investment; this is influenced by the probability distribution of return that best suits the investors predisposition towards risk. In finance diversification means reducing risk by investing in a variety of assets; it is a technique for reducing investment risk. If prior expectations of returns on all assets in the portfolio are identical, the expected return on a diversified portfolio is identical to that on an undiversified portfolio. The simple measure of financial risk is variance. Diversification may lower the variance of portfolio's return below what it would be if the entire portfolio is invested in the asset with the lowest variance of return even if the assets' returns are uncorrelated. In this scenario, let asset A have stochastic return $ä$ and asset B with a stochastic return of $ß^*$ with returns variances $\sigma_{ä}^{\ 2}$ and $\sigma^{\ 2}_{ß*}$; given q as a fraction of a one unit portfolio that is placed in asset A and the fraction 1-q is in B; the stochastic portfolio return is $q\,ä + (1-q)\,ß^*$. When $ä$ and $ß^*$ are uncorrelated, the variance of the portfolio return is Var $(q\,ä + (1-q)\,ß^* = q^2\,\sigma_{ä}^{\ 2} + (1-q)^2\,\sigma^{\ 2}_{ß*}$. The variance minimizing value is $q = \sigma^{\ 2}_{ß*} / (\sigma_{ä}^{\ 2} + \sigma^{\ 2}_{ß*};)$ which strictly lies between 0 and1. It is noted that favourable effect of diversification on portfolio

variance cannot be eliminated. More assets in a portfolio lead to greater diversification benefits particularly when portfolio variance can be considered as a function of assets invested by the firm.

Samuelson (1967), noted that on considering portfolio variance of '*n'* the number of assets; when all assets returns are mutually uncorrelated and have identical variances σ^2,the portfolio variance is minimized by holding all assets in equal proportions 1/*n*. Then portfolio return's variance equals Var{ $(1/n)x_i + (1/n)x_{ii} + ... + (1/n)x_n$} = $n(1/n^2)\ \sigma_x^2 = \sigma_x^2/n$ which monotonically decreases in *n* (number of assets). When adding uncorrelated risky assets to a portfolio, it increases the portfolio size but it may not be regarded as diversification for it is mere subdivision of the portfolio among many smaller investments. Rose (1999) expressed that in the case of adding investments, the portfolio's return is expected to be $x_i + x_{ii} + ... + x_n$ instead of $(1/n)x_i + (1/n)x_{ii} + ... + (1/n)x_n$; and the variance of portfolio return for uncorrelated is Var $(x_i + x_{ii} + ... + x_n) = (\sigma_x^2 + \sigma_x^2 + ...+ \sigma_x^2 = n\ \sigma_x^2$ which is increasing in *n* rather than decreasing. This finding inadequately satisfies the relationship between diversification and portfolio efficiency; the question arises on the level of interaction between investment constraints with diversification to bring out portfolio efficiency.

Theory and evidence indicate that large multi-business firms enhance performance by developing and exploiting corporate level distinctive competencies aligned to capital structure and financial performance; diversification has value effects as capital structure impacts on profitability, risk profile and overall shareholder value. The effect of diversification strategy on capital structure exist a non-significant relationship between corporate leverage and degree of corporate diversification. Further analyses indicate appositive correlation between levels of product diversification and firm performance (Montgomery, 1994; Modigliani and Miller, 1958; Alonso, 2003; Aleson and Escuer, 2002). These study contradicts a study by Chakrabarti et al. (2007) that diversification negatively impacts performance and it offers limited benefits when economy-wide shock strikes.

Gonz'alez and Gonz'alez (2012), financing decisions varies among firms as per the pecking order theory; there exist influence of profitability, investments opportunities and intangible assets on corporate debt. This has a bearing on investment appraisal and the diversification alternative selected by firms for resource allocation. Muzir(2011), suggested that the effect of corporate size on financial performance and sustainability differ according to how firm size expansion in being financed. Corporate firms trade off the reduction in operating risk due to diversification with increased financial leverage and thus systematic risk remains the same. The study used theoretical considerations to examine the effects of various diversification strategies on the capital structure of firms and on systematic risk; the study documents that firms reduce their operating risk by diversification and increase financial leverage to take advantage of tax benefits (Raphael and Livnat,1988).

According to the pecking order theory, firms are financially constrained due to information asymmetry between managers, owners and investors, therefore firms adopt hierarchy in selecting sources of finance. A negative relationship is expected between profitability and debt. Firms with high growth opportunities undertake investments which generate greater needs for finance; when internal finances are exhausted firms prefer debt capital rather than external equity for funding growth opportunities (Sogorb-Mira, 2005; Ramalho,Silva 2009: Gonzalez,Gonzalez, 2012; Shyam-Sunder, Myers,1999). Considering that a higher level of tangible assets increases the possibility of offering collaterals, lessening problems of information asymmetry between managers, owners and creditors. Appositive relationship exists between asset tangibility and debt. The financing behaviour of firms along the life cycle, older firms have greater capacity to retain and accumulate earnings; the need to resort to external financing requirements is less compared to the case in young firms (Michaelas et al. 1999; Sogorb-Mira,2005; LaRocca et al, 2011).

In portfolio selection problems, it is accepted that investors must deal with a tradeoff between expected returns and the variance of returns. Ross (1976) generalized the Security Market Line (SML) in the CAPM to a multi-factor case which served as a basis for the Multi-Factor Model. Fama and French (1993) showed a multi-factor model containing three factors: the market index, firm size and the book to market equity. It is noted that in portfolio selection the original data brought to the model are not always accurate; it may be subject to errors indicating that result may be influenced by disturbance in the parameters relating to this data; when investments chosen are many, the aggregate portfolio risk is minimized and returns maximized. Bertero (1998) an image of investment alternative is not the same in the real world scenario. Despite the theoretical importance of the modern portfolio theory, is it ideal to use it in the soft drink industry when the same model has failed on financial markets. This motivates this study on the sense that diversification sets are just predictions that can either be real image or contrary in terms of investment returns thus influencing portfolio efficiency. Poterba and Summers (1995) study indicated that most firms use more than one hurdle rate based on a specific asset being selected or considered to the portfolio set; later studies show a substantial increase in the Weighted Average Cost of Capital (WACC) usage to 93 % as a factor in asset selection for portfolio construction (Bruner et.al, 1998). The recent studies by Ryan and Ryan (2002) and Meier and Tarhan (2007) report similar trend. Bruner et.al (1998), examined how firms compute WACC. The findings show that firms generally base WACC weights on the market value rather than book values and base the after tax cost of debt on the marginal tax rate. The study further shows that the use of CAPM to estimate the cost of equity has increased to 74% by firms (Gitman and

Mercurio, 1982; Graham and Harvey, 2001). McDonald (1998) notes that rules of the thumb such as payback and hurdle rate can approximate optimal decision rules that account for the option-like; all these are investment constraints to diversification and portfolio efficiency.

Investments are prioritized depending on the level of risk involved. Risk analysis is on how to incorporate risk in making capital budgeting decisions. Evidence suggest that firms use sensitivity analysis as the primary risk assessment tool(Ryan and Ryan,2002). A risk adjustment in most firms is done by changing the required rate of return, adjusting the cash flows and modifying the payback period. Stanley and Block (1984) and Shao and Shao (1996) studies indicate that firms use risk adjusted cash flows more frequently than risk adjusted discounted rates. The process of incorporating risk by adjusting discount rates or cash flows is not formal but ad hoc. Trahan and Gitman (1995), firms shun formal techniques, the formal models are impractical, based on unrealistic assumptions, hard to explain to top management and difficulty to apply. Mukherjee (1987) study indicates that sophisticated models are avoided due to their inability to reflect risk from the firm's perspective, their need for massive amounts of data and the need for high data processing efficiency. Risk estimation, approximation of risk metrics, investor risk perception and sensitivity analysis impact on any investment selection for a firm's diversification. In 2006 the China Enterprise Confederation (CEC) concerned itself on the company's failure; as most of the companies lost business because of diversification. It was observed that even china's best company Lenovo Group failed in diversification. Study by Zhaoliang and Xiaonan (2006) analysed diversification in 51 retail listed companies of which 29 were controlled by the state and 22 companies were privately owned. The study used regression analysis; the independent variable was index of diversification and relative book value of the company. The findings indicated that diversification significantly influenced the corporate value and more diversified companies performed worse in China's economy. Gordon and Myers (1991) their study indicate that the intensity of performance evaluation is tied to the asset base. Thus the level of intensity is highest for strategic assets which is similar to the recent expansion observed in Kisii Bottlers limited and Equator bottlers limited which are the only firms producing carbonated soft drinks in western Kenya.

3. Research Methodology

This study was a descriptive survey design on investments of firms in the soft drink industry in western Kenya. The study target population was 250 respondents and a census sampling technique was adopted. Both primary and secondary data were used in this study; an interview schedule was used. Reliability of the instruments was provided using Cronbach's Alpha; the results of analysis found Cronbach's Alpha of 0.970 which suggest strong internal consistency of the research instrument compared to its standard of 0.7. Secondary data was obtained from the firm's financial statements relating to assets used by the marketing and finance departments. Quantitative data analyses were done using descriptive statistics and inferential statistics. Descriptive statistics involved the use of percentages and means, and regression equations to establish the relationship between complex investment constraints, diversification and portfolio efficiency in the soft drink industry. Inferential statistics were used in this study to make statistical inference and testing of hypotheses; ANOVA was used to form the basis of accepting or rejecting the null hypotheses.

4.0 Results and Discussion

The uncertainty in portfolio selection arise due to imperfect knowledge on the complex investment constraints like firm's capital structure, level of investment risk, sensitivity analysis of investment opportunities and level of investment information available to investors. The study results on the relationship between investment constraints and diversification on portfolio efficiency is presented as below.

Table 4.1: Coefficients for Investment Constraints and Investment Diversification

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
1 (Constant)	2.002E-15	.014		.000	1.000
Firm's Capital Structure	-1.588E-14	.021	.000	.000	1.000
Level of Investment Information	.778	.027	.786	28.650	.000
Level of Investment Risk	.222	.031	.214	7.226	.000

a. Dependent Variable: Diversification

Diversification depends on firm's capital structure, level of investment information and level of investment risk. The complex investment constraints tend to define the direction of investors investment sets selection in a portfolio.

Diversification = 2.002E-15 - 1.588E-14 FCS + 0.778 LII + 0.222LIR

The equation shows that capital structure as a constraint doesn't have any significant contribution to

diversification. Level of investment information and level of investment risk significantly contribute to investment diversification..

Investors have typically attempted to diversify portfolios through a process of naïve diversification resulting from inadequate consideration of complex investment constraints. The importance of each asset in a portfolio is by 'best' combination of assets in terms of its relative risk and return characteristics as measure by mean and standard deviation of assets for diversification (Lee, 1992). Therefore given the parameters as per the modern portfolio theory, a combination of assets that for each level of risk will offer highest level of return. Such works typically uses historic data to test the effectiveness of diversification strategies. Therefore, level of investment information has the highest contribution to investment diversification among investors.

Table 4.2: Model Summary for Investment Constraints and Investment Diversification

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.984[a]	.967	.967	.07952	1.063

a. Predictors: (Constant), Level of Investment Risk, Firm's Capital Structure , Level of Investment Information

b. Dependent Variable: Diversification

Table 4.2 results show that a strong association exists between complex investment constraints and diversification (R = 0.984) and the variation in investment diversification can be accounted for upto 96.7% by the regressors: firm's capital structure, level of investment information and level of investment risk. Investment diversification reflects strategic decisions of firms (Hitt et al, 1994). However, only a few studies show that diversification is important determinant of capital structure. Industrially diversified firms have higher debt ratios due to risk reduction. Firms need to carry greater leverage to maximize firm value. Diversification across product lines is at best unrelated to debt usage (Li and Li, 1996; Singh et al, 2003; Barton and Gordon, 1988; Lowe et al, 1994). This concurs with findings of Larry (2010), study results indicated that it is important to delineate different diversification strategies in establishing the determinants of capital structure.

Table 4.3: ANOVA: Investment Constraints and Investment Diversification

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.060	3	15.353	2428.043	.000[a]
	Residual	1.556	246	.006		
	Total	47.616	249			

a. Predictors: (Constant), Level of Investment Risk, Firm's Capital Structure, Level of Investment Information

b. Dependent Variable: Diversification

The results in table 4.3 indicate a significant relationship between investments constraints and diversification (F= 2428.043, $p < 0.005$). Organizational economics suggest economic characteristics of unrelated versus related diversification strategies calls for different types of financing. The essence is that firms diversify in response to the presence of unutilized resources and to reap benefits that are costly to realize through external market transactions. Hence, firms that undertake unrelated diversification strategies may be financed by debt while firms with related diversification strategies may be financed by equity. Firms with better growth opportunities (investment sets) tend to have more information a symmetry and greater underinvestment problem (Ozkan, 2001). Information asymmetries on risk or investment's growth can lead to high agency costs of debt as a result less debt financing.

The study indicate that diversified investments opportunities form an efficient portfolio in the Soft Drink Industry; a perfect correlation exist between diversified alternatives and efficient portfolio; the alternatives were categorized as worst diversification alternative(WDA), average diversification alternative(ADA) and best diversification alternative(BDA).

Table 4.4 Correlations: WDA, ADA, BDA and Portfolio Efficiency

		WDA	ADA	BDA	PORTFOLIO EFFICIENCY
WDA	Pearson Correlation	1			
	Sig. (2-tailed)				
ADA	Pearson Correlation	.642**	1		
	Sig. (2-tailed)	.000			
BDA	Pearson Correlation	.407**	.635**	1	
	Sig. (2-tailed)	.000	.000		
PORT.EFF.	Pearson Correlation	.458**	.713**	.890**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	250	250	250	250

**. Correlation is significant at the 0.01 level (2-tailed).

There was a positive correlation for the diversification alternatives to portfolio efficiency; worst diversification alternative (0.458**), average diversified alternative (0.713**); and best diversified alternative (0.890**); and this correlation was significant at ($p<0.01$; 2-tailed.

Table 4.5: Model Summary Diversified Investments Sets and Efficient Portfolio

					Change Statistics
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.911[a]	.829	.827	.19371	.000

a. Predictors: (Constant), Best Diversification Alternative, Worst Diversification Alternative, Average Diversification Alternative

The results indicate that R is 0.911[a] strong correlation exist between diversification sets (WDA, ADA, and BDA) and portfolio efficiency; and R^2 is 0.829 indicating that the variation in portfolio efficiency is accounted for upto 82.9% by the predictors and only 17.1% is unexplained.

Table 4.6 : ANOVA Diversified Investments sets and Portfolio Efficiency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.805	3	14.935	398.020	.000[a]
	Residual	9.231	246	.038		
	Total	54.036	249			

a. Predictors: (Constant), Best Diversification Alternative, Worst Diversification Alternative, Average Diversification Alternative

b. Dependent Variable: Portfolio Efficiency

The results further indicate a significant relationship between investment alternatives (WDA, ADA, and BDA) and portfolio efficiency (F= 398.020; p 0.000< 0.05*)*. The contribution of diversification alternative towards portfolio efficiency shows that only ADA and BDA have positive contribution while WDA has negative contribution to portfolio efficiency; there exist a significant relationship between ADA, BDA and portfolio efficiency.

Table 4.7: Coefficients WDA, ADA, BDA and Portfolio Efficiency

		Unstandardized Coefficients		Standardized Coefficients		
	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	2.103E-16	.052		.000	1.000
	WDA	-2.795E-15	.034	.000	.000	1.000
	ADA	.231	.038	.248	6.103	.000
	BDA	.769	.036	.733	21.487	.000

a. Dependent Variable: Portfolio Efficiency

The results indicate that portfolio efficiency depends on diversification sets constructed by investors.

PORT.EFF. = 2.103E-16 – 2.795E-15 WDA+ 0.231ADA + 0.769 BDA

Therefore in the soft drink industry only average diversification alternative and best diversification alternatives do cause an increase in portfolio efficiency.

Part analysis of ADA, BDA and portfolio efficiency show better performance in portfolio efficiency; the R is 0.911, R^2 is 0.829; and adjusted R^2 has a dismal increase; but the F value increased from 398.020 to 599.45; this indicate that ADA and BDA are better in influencing portfolio efficiency.

Table 4.8: Coefficients[a] of ADA, BDA and Portfolio Efficiency

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-9.333E-16	.050		.000	1.000
	ADA	.231	.032	.248	7.283	.000
	BDA	.769	.036	.733	21.530	.000

a. Dependent Variable: Portfolio Efficiency

Therefore, efficient portfolio depends on ADA and BDA the model reduces to;

PORT.EFF. = -9.333E-16 + 0.231ADA + 0.769 BDA

An increased use of best diversification alternatives contributes to increased portfolio efficiency in firms**.**

Table 4.9: Model Summary for ADA, BDA and Portfolio efficiency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					F Change	df1	df2	Sig. F Change
	.911[a]	.829	.828	.19332	599.457	2	247	.000

a. Predictors: (Constant), Best Diversification Alternative, Average Diversification Alternative

Table 4.10: ANOVA[b] ADA, BDA and Portfolio efficiency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.805	2	22.403	599.457	.000[a]
	Residual	9.231	247	.037		
	Total	54.036	249			

a. Predictors: (Constant), Best Diversification Alternative, Average Diversification Alternative

b. Dependent Variable: Portfolio Efficiency

In order to determine the significance of the influence of diversification alternatives on portfolio efficiency, the t-test was applied. For the constant b_0 = -9.333E16; T_0 = 0.000, the p values (p> 0.05) study fails to reject H_0 and conclude that b_0 = -9.333E16 is not significantly different from zero. For ADA its b_1 = 0.231; T_1 = 7.283,(p< 0.05): the study rejects H_0 and conclude that b_1 is significantly different from zero; and it is statistically significant to portfolio efficiency. For BDA its b_2 = 0.769; T_2 = 21.530,(p< 0.05); b_2 is significantly different from zero; and it is statistically significant to portfolio efficiency.

When only BDA is considered in portfolio efficiency it gives the best result in portfolio efficiency.

Table 4.11: Coefficients[a] BDA and Portfolio Efficiency

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.066	.054		1.208	.228
	BDA	.934	.030	.890	30.775	.000

a. Dependent Variable: Portfolio Efficiency

Therefore the model for diversification alternative and portfolio efficiency reduces to;

PORT.EFF. = b_0 + b_1 BDA+ e

PORT.EFF. = 0.066 + 0.934 BDA

The equation indicate that best diversification alternative promotes portfolio efficiency in firms.

Table 4.12: Model Summary for BDA and Portfolio Efficiency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.890[a]	.792	.792	.21264	.792	.000

a. **Predictors: (Constant), Best Diversification Alternative**

Table 4.13: ANOVA[b] BDA and Portfolio Efficiency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.823	1	42.823	947.112	.000[a]
	Residual	11.213	248	.045		
	Total	54.036	249			

a. **Predictors: (Constant), Best Diversification Alternative**
b. **Dependent Variable: Portfolio Efficiency**

In order to determine the significance of BDA (best diversification alternative) on portfolio efficiency, the t-test was applied. For the constant $b_0 = 0.066$; $T_0 = 1.208$, the p values ($p > .05$) we fail reject H_0 and conclude that $b_0 = 0.066$ is significantly different from zero; but is not significant to portfolio efficiency ($p>0.05$). For BDA its $b_1 = 0.934$; $T_1 = 30.775$; ($p< 0.05$): the study rejects H_0 and concludes that b_1 is significantly different from zero; and it is statistically significant to portfolio efficiency. Thus BDA is the best model for selection of efficient portfolio ($F= 947.112$; $R= 0.890$; $R^2= 0.792$; $p< 0.05$).

5. Conclusion

The study results on complex investment constraints and diversification on efficient portfolio indicate almost perfect correlation; and a significant contribution of best diversification alternative (BDA); which when considered in portfolio efficiency gives the best result (optimal performance). Carefully and expertly formed judgments concerning the potentialities and weaknesses of investments alternatives form the best basis upon which to analyze portfolio efficiency. The study based on the results of diversified investments alternatives and efficient portfolio; it recommends for consideration of only BDA in portfolio efficiency for a firm to realize the best performance associated with portfolio efficiency.

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