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Influence of Investment Appraisal on Efficient Portfolio Selection in the Soft Drink Industry in Kenya

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Abstract
Investment appraisal tools rank investments according to their efficiency and optimality of returns. Portfolio return is thought as a linear function of asset weights and its volatility as a non- linear function indicating that portfolio volatility is less than weighted average of individual asset volatility. 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. Companies in the soft drink industry in Kenya have adopted performance optimization strategies on various investments in order to compete in new and turbulent business environment and mostly use projected cash flows for investment appraisal, it is clear that an image of investment alternative is not the same in the real world and these investment alternatives in a set can either be efficient or inefficient. This study focused on the contribution of investment appraisal on efficient portfolio selection. The research adopted a survey design with a target population of 250 respondents selected by census technique. Primary data was collected using an interview schedule and secondary data was collected from respondent's records relating to real and financial assets. Study results indicate a strong correlation between investment appraisal techniques and investment alternatives (F= 293.094, R=0.926; R^2=0.857; p = 0.000 < 0.05) and investment appraisal account for 85.7% of investments alternatives, their ranking is influenced by the type of investment appraisal tools applied, a significant relationship exist between investment appraisal techniques and portfolio efficiency (F= 259.64; R^2 = 0.842; p 0.000 < 0.05);therefore investments appraisal techniques application influence efficient portfolio selection in the soft drink industry; Part analyses of the investment appraisal techniques on portfolio efficiency show that PBP has a higher significant relationship with portfolio efficiency(F=1037.205; p 0.000< 0.05). Study results suggest the need for firms to maximize the application of net present value and payback period to enhance portfolio efficiency to realize optimal performance.
Keywords: Kenya, Soft Drink Industry, Investment Appraisal, Diversification, Efficient Portfolio

1.0 Introduction

The father of modern portfolio theory (Markowitz, 1952, 1959) formulated the portfolio problem as a choice of the mean and variance of a set of assets. The theory summarized two fundamental principles: holding constant variance while maximizing expected return and holding constant expected return while minimizing variance. These principles led to the formulation of an efficient frontier from which the investor could choose preferred portfolio depending on individual risk return preferences. The assets cannot be selected only on characteristics that are unique to the security, but the investor considers how each security co-moves with all other securities. Since 1950's several models were developed relating to portfolio theory like Capital Asset Pricing Model, Inter-temporal Capital Asset Pricing Model, Arbitrage Pricing Theory and the Consumption oriented Capital Asset Pricing Model (Mankiw and Shapiro, 1986). CAPM model indicate that investment's risk premium offered by all capital assets are ranked, but risk premium offered by the market as a whole is not explained; further forecast on the rates of return do not depend on actual capital asset prices or those in the balance sheets a scenario limiting investors using CAPM when comparing different feasible capital market equilibria.

The investment appraisal tools assess the economic prospects of a proposed investment opportunity; the methodology calculate the expected return based on the cash flow forecasts of many interrelated investment variables; risk analysis involves sensitivity and scenario analyses through to their logical conclusion an application utilizing a wealth of information to describe the uncertainty surrounding the key investment variables. Graham and Harvey (2001) focused on the popularity of the different investment appraisal techniques used by firms; the findings show an increasing tendency to rely on discounted cash flow methods to evaluate investment opportunities. The tools are subjective in nature and it is not possible to judge whether the magnitude of the hurdle rate used is appropriate. The hurdle rates must be related to the firms risk component, that is, systematic risk and unsystematic risk. Some firms use firm-wide hurdle rates even when they have multiple divisions, this rates have the potential to harm shareholders by creating problems of under-investment or over-investment (Trahan and Gitman, 1995).

Large firms use extensively the Discounted cash flow techniques (DCF) where NPV is relied on by 90% of the

firm's and use of Payback Period method is simple proxy measure to capture the impact of liquidity constraints and risk. Firms use a combination of techniques, but it is unclear which techniques are considered to be most important in decision making process. Further financial appraisal techniques are cited as major reasons for underinvestment in the new manufacturing technology. This criticism relate to the incorrect application of the techniques rather than weaknesses of the financial appraisal system. The internal rate of return (IRR) and net present value (NPV) have long been the accepted investment appraisal techniques preferred by corporate management and financial theorists. The corporate management prefer the yield- based technique (IRR) while financial theorists based orthodox economic theory endorse the NPV method. However, both methods suffer from inconsistencies (Drury and Tayles, 1997; Primrose, 1991; Fisher, 1930; Bierman et.al 1975; Emery, 1982; Grant et al.1976; Miller, 1987; Ross, 1995; Taylor, 1964; and Woods et.al.1989).

Income earning investment may have multiple IRRs if some of the net cash flows are negative; to correct the deficiencies of IRR the terminal value is computing based on the compounding of the investment's cashflow stream at an explicit reinvestment rate equal to the firm's cost of capital. The simplified internal rate of return, IRR*, equates the investment's terminal value to the initial cost of the investment; and it is thought of as a measure to correct the deficiencies of the IRR. Further contradictions and ambiguous results are noted when employing IRR due to the differences in reinvestment rate assumptions where cash flows are assumed to be reinvested at the corporate cost of capital when NPV method is employed; however unique problems to IRR can be corrected through the formulation of Modified Internal Rate of Return (Samuelson, 1937; Solomon, 1956; Clark et.al, 1979; Lin, 1976; and Tiechroew, 1965; Tiechroew, 1965).

McDaniel et al.(1988), developed IRR model equivalent to MIRR but adjusted the terminus period in an attempt to accommodate investments with unequal lives; later David(1997) demonstrated that the MIRR model do not maximize shareholders wealth and is inconsistent when investments differ in their economic lives. David (1997) asserted that rate of return on invested asset (RRIA) model is theoretically sound if the Fisherian (Fisher, 1930) assumptions of wealth maximization are maintained. The model is consistent 85.7% on the varying economic environments and allows corporate management to select investments based on the maximization of the percent of return of total assets. The RRIA express the annualized rate of return per total invested assets over the life of the investment; employing the technique is similar to IRR where the investment is similar to IRR where the investment deem profitable if RRIA is greater than the firm's cost of capital and the ranking of investments occurs from the highest to lowest marginal rate of return. It is clear that optimal investment appraisal techniques allow the management to select independent investments separate from other investments or as a combined package without inconsistency in the investments selected (Weston and Copeland, 1992).

The value additive principle demands that firms be able to select one investment independent of all others; an investment appraisal method that does not violate this principle allow affirm to select one of the mutually exclusive investments. Therefore the implication of inconsistency of the IRR as a technique is that every combination of possible investments must be considered by the firm. When nonnormal investments are accounted for by the investment appraisal techniques; the inconsistency of IRR to select profitable investments and maximize shareholder wealth occurs when an asset's cash flows are nonnormal. When a nonnormal asset having a large outflow of cash either sometime during or at the end of the assets life is considered and IRR tools is used in this situation three inconsistencies arise; first if the investments are mutually exclusive, the IRR may select unprofitable investment and simultaneously reject the profitable investment; secondly, a nonnormal investment may not have an IRR and finally a nonnormal asset may have multiple IRRs (Brigham and Gapenski, 1985). In contrast both NPV and RRIA do not violate the additive principle, a firm employing RRIA to maximize the rate of return on total assets; any investment appraisal technique employed to rank investments must consider the maximum rate of return without considering multiplicative number of different asset combination. This in turn raises the question on the correlation of assets; only uncorrelated assets have a combination of maximum return with minimization of risk. In their original form, both NPV and MIRR are computed from cash flows generated from an original investment, without allowance for the possibility of replacement of the investment upon termination. However, the more common and realistic asset is on in which the asset continues after termination of the investment's economic life with the ability to purchase another investment. This lack of consideration for future investments create conflicting and ambiguous accept or reject decisions and fail to consistently maximize shareholder wealth when mutually exclusive investments have different economic lives (Bierman,1975; Emery,1982;Grant,1976; and Osteryoung,1979). This study was motivated by the contribution of investment appraisal techniques towards investment ranking and subsequent formation of diversification alternatives that a firm may allocate resources.

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. Optimal portfolio selection theory plays an important role for both practitioners and researchers of financial sector; Markowitz approach is based on minimizing the portfolio risks for a given level of expected return, 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. Constructing portfolio weights in practical situation the investor faces the problem on parameters of the asset return's that are unknown. Hence the investor is unable to define the portfolio weights explicitly and instead the estimation of portfolio weights is considered which is inadequate in terms of accuracy (Litterman, 2003). Adler and Dumas (1983) asserted that there is no statistical theory to provide inferences about the distribution properties of the estimated optimal portfolio weights. This argument is based on the fact that an analyst is not able to calculate confidence intervals for the optimal portfolio weights. Markowitz (1952) developed the first mathematical model to describe the portfolio selection problem in which the return and risk are measured by mean and variance respectively. The critical issues in implementing the portfolio theory model are the calibration of the model to achieve the accurate expected returns, risks and correlations among selected investments (Mech, 1993).

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). It is paramount to have accurate estimation of parameters for relevant mean and variance determination. 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 investors perform a "what if" analysis attaching prices and statistics to rate of return of 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. The conventional way of estimating parameters is the use of historical data for the determination of sample means, variances and correlations which are then used for modeling investment selection. The appropriate data for investment appraisal may not always be available; thus sample statistics may vary depending on particular time periods used consequently this approach may be highly unsatisfactory. In a special case where the correlation between all assets is zero and all the assets have the same risk, the standard deviation can be reduced by mixing several assets rather than just two. Thus as the number of investments increase the standard deviation of a portfolio become a function of these investments (Fama, 1976). Future cash flows conversion to real cash flows, the projected amount 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 for real cash flows to be discounted at real discount rate. This finding indicates a potential mismatch of assumptions regarding cash flows and discount rates that are used in investment appraisal decisions. The resultant effect on investment appraisal tools like NPV their values are understated and contribute to rejection of investments that are viable. Firms are guilty of rejecting worthwhile investments because of improper treatment of inflation in the financial appraisal. The inflation is thought to affect both the future cash flows and cost of capital that is used to discount the projected cash flows for investment proposals (Drury and Tayles, 1997; Finnie, 1988).

Investment decisions tend to concentrate on the tools for asset selection, management ensures consistency of investment pattern with organizational strategies by adopting appropriate strategies to guide investment decision. Strategic investments in the soft drink industry are substantial and involve high levels of risk, producing outcomes that are difficult to quantify and with a significant long term impact on the firm's corporate performance. The soft drink industry in western Kenya has experienced major product lines, installation of new manufacturing processes, advanced manufacturing and business technologies. Given the nature and effect of such investments decisions it is important to subject them to appraisal techniques for alignment with organizational goals (Klammer and Wilner, 1991; Pike, 1996; Abdel-Kadr and Dugdale, 1998).

In Kenya, the carbonated soft drink industry consists of three players these are Coca Cola, Softa and Milly food processors. The Pepsi Company had operations in this country but closed shop in the 1980s (Financial Standard,

October 26th 1999); despite its closure of business, today the company is back in business. Coca Cola, of the three players is the market leader with over 96% of the market share. 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). This study was centered on companies handling the production and distribution of the Coca Cola brands within their franchise territory in western Kenya. The companies' distribution network consists of Key Distributors (KDs), Strategic Supply Depots (SSDs), Stockists, retailers and street vendors.

The focus on Kenya's soft drink industry was due to the sub-sector's great contribution to the overall performance of the economy; it is one of the contributors to the industrial GDP. Secondly, the sub-sector is continuously affected by macro-environmental factors of the industry that have led to change, mergers and consolidations in the soft drink industry's market players. Many of the companies in the soft drink industry project to drive revenue growth and improve their market share through increased economies of scale through mergers and acquisitions (Data monitor, 2005). This trend increased competition as firm's diversification of products increase in the soft drink industry in Kenya. Thirdly, the changing societal concerns, attitudes and lifestyles trends are influencing the industry as well as consumer awareness of health problems represents a serious risk to the carbonated drinks sector (Data monitor, 2005). The trend is causing the industry's business to differentiate their products through investments in assets to increase sales in their markets. It is imperative to embrace constant product innovation to recognize consumer wants and needs while maintaining the ability to adjust with the changing market (Murray, 2006). There were inadequate studies on how investment appraisal and efficient portfolio selection were related in this industry particularly in Kenya.

The use of appropriate investment appraisal tools help in ranking investments according to their efficiency and optimality of returns for selection. 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. A combination of investment appraisal tools and efficient portfolio selection may account for the contradiction to portfolio theory for uncorrelated assets. Past studies have concentrated on simple accept-or- reject investments decisions with conventional cash flows without taking into account firms with complex investment situations and problems. Further 75% of companies that have used this theory for practical investments show 5% profit to total assets ratio indicating dismal performance. Past studies indicate that companies are under-investing because of misapplication of investment appraisal techniques. The parameters of investment appraisal models have a random disturbance term appended and their distribution properties specified, unfortunately little attention has been paid to the source of these disturbances; firms in the soft drink industry are not an exception. Companies in the soft drink industry use performance optimization strategies on their investments for them to compete in the new and turbulent business environment; mostly projected cash inflows are used during investment appraisal, it is clear that image of investment alternative is not the same in the real world and these alternatives can either be efficient or inefficient. Further, investment costs under uncertainty when factored in the appraisal complicate the investment decision. Firms in the soft drink industry in western Kenya despite their capital structure base their performance is low over the years when compared on a net to net basis and are still financing capital investments like the recent ultra modern production plant for Equator Bottlers limited.

1.1 Objectives of the Study

The study was guided by the following objectives:

i) Establish whether investment appraisal techniques select the best investment alternatives in the soft drink industry
ii) Establish whether investment appraisal techniques influence efficient portfolio selection in the soft drink industry
iii) Examine the relationship between investment's appraisal techniques and efficient portfolio selection in the Soft Drink Industry

1.2 Hypotheses of the Study

Hypothesis 1: H_o: Investment appraisal techniques positively help in the selection of investment alternatives in the Soft Drink Industry

Hypothesis 2: H_0: Investment appraisal techniques influence efficient portfolio selection in the Soft Drink Industry

2.0 Review of related Empirical Literature

Investment appraisal is the process of analyzing potential investments; decisions on investments are based on returns to beneficiaries. The process forms an important activity as huge funds can be wasted easily if the investment turns out to be wrong or unrealistic. The investment practice entails use of techniques that build on future value of money spent now. Implications of uncertainty on investment decisions remain controversial; it is held that individuals are not indifferent to uncertainty and this apply to investors decisions on investments, therefore assets may have uncertain returns of their expected values due to prediction or estimation (Eugene and Houston, 2004). The investment appraisal tools entail the use of capital budgeting practices: Net Present Value (NPV), Payback Period (PBP), Profitability Index (PI) and Internal Rate of Return (IRR). The net present value (NPV) of an investment proposal is the present value of the proposal's net cash flows less the proposal's initial cash outflow, (Van Horne and Wachowicz, 2005). NPV requires the selection of a discount rate that gives NPV>0. For capital budgeting process where multiple investments are being appraised and limited budgets mean that some investments cannot be funded, NPV helps in ranking in order of priority. The objective of this practice is the maximization of NPV. The Internal Rate of Return is the discount rate for an investment that result in a NPV= 0, that is, the rate at which the Present Value (PV) of measured benefits equals the PV of measured costs. The IRR is used to appraise individual investments and provide information to help make decisions about appraising and ranking multiple investment opportunities (Pandey, 2005). With individual investments the appraisal must compare the IRR with the pre-selected rate of return (hurdle rate) which usually represents the cost of capital. The objective of this capital budgeting practice is to ascertain the investment's earning rate (IRR) equal to or greater than the hurdle rate.

According to Van Horne (2006), payback period is considered one of the most popular and widely used traditional methods of evaluating investment opportunities. Any investment with a payback period less than the pay back standard is accepted. It gives an insight of the liquidity of the investment. Profitability index (PI), also known as Profit Investment Ratio (PIR) and value investment ratio (VIR), is the ratio of investment to payoff of a proposed investment. It is a useful tool for ranking investments because it allows quantification of the amount of value created per unit of investment. As the value of the profitability index increases, so does the financial attractiveness of the proposed investment (Pandey, 2005).

Different investors adopt different investment strategies in seeking to realize their investment objectives. The optimal investment decision always corresponds to the solution of an expected utility maximization problem, therefore risk itself 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). Mean-variance optimization is very sensitive to errors in the estimates of inputs. Choppra and Ziemba (1993) study on ten selected Dow Jones Industrial Average (DJIA) securities, the study analyzed mean variance optimization forecasts like mean returns, variances and covariance's using historical data on the assumption that they are true values of these parameters. Research findings revealed that small changes in input parameters results in large changes in composition of the optimal portfolio. They concluded that the use of historical inputs or data based on complex forecasting scheme, the results continue to hold as long as the inputs have errors. Further analysis on the influence of errors in parameter estimates on the resulting optimal portfolio, findings indicate that the portfolio is sub-optimal for the investor because it is not based on true input parameters. Therefore investment opportunities in the soft drink industry are not exception to this input parameter dynamics.

Investors use the mean variance framework to allocate wealth among individual assets and set all their expected returns to zero; the findings indicate that using forecasts that do not accurately reflect the relative expected returns of different investments substantially degrade Mean-Variance performance (Choppra and Ziemba, 1993). Investors who care only about the mean and variance of static portfolio returns hold a portfolio on a mean variance efficient frontier characterized by Markowitz (1952) where optimal performance is possible. However, because of estimation error, policies constructed in firm's using these estimators are extremely unstable, and 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. This study is motivated by the contribution of investment appraisal techniques to achieving portfolio efficiency in the soft drink industry.

Value at risk (VaR) is a key tool for risk management; the risk measurement models assist in understanding and setting risk prevention strategies. VaR provides a quantitative and synthetic measures of risk that takes into account the many kinds of relation that exist 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; 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, 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. The risk taker investor invests on opportunities with high returns while showing less concern in the risk involved (Brealy and Myers, 1992; Savvakis, 1994).

Financing decisions varies among firms as per the pecking order theory; and this influence profitability, investments opportunities and level of intangible assets on corporate debt. The effect of corporate size on financial performance and sustainability differ according to how firm expansion is financed. Corporate firms trade off the reduction in operating risk due to diversification with increased financial leverage as systematic risk remains the same; firms reduce their operating risk by diversification and increase financial leverage to take advantage of tax benefits. 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. 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 (Sogorb-Mira, 2005; Ramalho, Silva 2009: Gonzalez,Gonzalez, 2012; Shyam-Sunder, Myers,199; Michaelas et al. 1999; LaRocca et al, 2011; Muzir, 2011; Raphael and Livnat,1988).

Previous studies on how to evaluate investments mainly focused on large firms and study findings suggested that internal rate of return (IRR) are the primary method for valuation. Gitman and Forrester (1977) surveyed 103 firms and the study revealed that 9.8% of firms use NPV as their primary technique and 53.6% of the firms use IRR as a primary technique. These study findings concurred with Stanley and Block (1984) whose findings indicated 65% use IRR as a primary Capital Budgeting Technique. These results are similar to findings in Trahan and Gitman (1995). Research by Burns and Walker (1997), suggest that NPV is superior to IRR, but the study surveys conducted consistently show that firms prefer IRR to NPV. It is implied that firms prefer IRR because it is easier to understand and compute than NPV; as its values can be compared more readily with returns from other investment opportunities. However this claim that IRR is easier to compute than NPV is questionable. Further when conflicts occur on firm's investment appraisal process the use of NPV technique is apparently favoured. A study by Apap and Massion (2004-2005), indicate that 56% of firms rely on NPV to resolve conflicts compared to 19% of firms in favour of IRR. These findings concur with Ryan and Ryan (2002). The payback technique remains popular as a secondary tool for investment evaluation despite its declining popularity as a primary tool. The percentage of firms using the payback period as a secondary selection tool is 39% (Kim and Farragher, 1981) and its use has increased to 72% (Trahan and Gitman, 1995).

Burn and Walker (1997) observed that payback technique continued popularity results from its ease of computation and usefulness in conjunction with discounted cash flow techniques as a measure of both liquidity and risk. Further, firms use more than one selection criteria; they combine pure financial techniques discounted cash flow (DCF) or non discounted cash flow with non financial measures such as strategic consideration.

Apap and Massion (2004-2005) study indicated that some methods give more information than others (72%) and therefore managers may lack confidence in using only one method. Further, Chen (2008) study concluded that firms with high product standardization tend to emphasise DCF analysis, while firms with low standardization tend to focus on using Non financial measures such as firm strategy, growth and competition. Thus firms that have investments requiring complex manufacturing processes or high Research and Development expenses (uncertain outcomes) rely more on non financial measures.

Investment opportunities analyses require appropriate choice of hurdle rate. Poterba and Summers (1995) study indicate that most firms use more than one hurdle rate based on a specific project being selected or considered; later studies show a substantial increase in the Weighted Average Cost of Capital (WACC) usage to 93 % (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 (Gitman and Mercurio, 1982). The use of CAPM is reported to be 74% by firms (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 features of many investments, especially in the evaluation of very uncertain investments.

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 and 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. This study is different from previous studies on risk analysis; part analysis of investment appraisal helped to establish influence on efficient portfolio selection.

Theoretically, no limit should be to the amount that firms can invest in projects as long as the return is equal to or greater than the required rate of return. In efficient markets, capital rationing may influence firms to limit the size of their capital budgeting consequently rejecting positive NPV investments. 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. The recent expansion observed in firms in the soft drink industry in western Kenya was of high intensity; the study focus was on whether investments in soft drink industry are efficient.

In portfolio selection problems investors deal with a tradeoff between expected returns and the variance of returns (Markowitz, 1952; Markowitz and Sharp,1964) investigated on the market equilibrium under conditions of risk and gave an asset pricing theory called CAPM. Further a study by Ross (1976) generalized the Security Market Line (SML) in the CAPM to a multi-factor case which serve as a basis for the Multi-Factor Model. Research by 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. Investment appraisal process also depends on estimated future expected returns these values are not expected to be accurate. Therefore, the data may choose an investment that falls in either efficient or inefficient portfolio. This information motivated this study to establish whether investment appraisal tools help choose best investment opportunities among alternatives that fall in efficient portfolio. Moreover, when investments chosen are many, the aggregate portfolio risk minimized and returns maximized. 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. Further, the projected cash inflows for an investment are just predictions that can either be real image or the contrary in investment returns. This images when used can they choose alternatives that fall in either efficient frontier or not.

3.0 Data and Methods

The study adopted a survey design on investments of firms in the soft drink industry in western Kenya. The study target population was 250 respondents selected by census sampling technique. Both primary and secondary data were used in this study. Primary data was collected using an interview schedule whose reliability was provided using Cronbach's Alpha; the determined value of Cronbach's Alpha was 0.970 which suggest strong internal consistency of the research instrument. Quantitative data analyses were done using descriptive statistics and inferential statistics. Descriptive statistics involved the use of percentages, means and regression equations for establishing the relationship between investment appraisal techniques and efficient portfolio selection. ANOVA was used to form the basis of accepting or rejecting the null hypothesis. The regression models used was;

$$PORT.EFF. = b_0 + b_1 ARR + b_2 NPV + b_3 PBP + b_4 IRR + b_5 PI + e \quad (1)$$

Where; PORT.EFF - is portfolio efficiency
e - Error term
$ß_0$, $ß_1$, $ß_2$, $ß_3$, $ß_4$ and $ß_5$ are regression coefficients.

4.0 Results and Discussion

The selection of potential investment is done using investment appraisal techniques which are designed to aid in the calculation of expected return from a promising investment opportunity. The profitability index was rated at 87.2%, net present value at 69.4%, payback period at 65.7%, internal rate of return at 52.48% and accounting rate of return at 44.6%.This study results indicate that PI is more preferred compared to other techniques; but concur with findings of Hall and Millard (2010) that NPV more popular than IRR in most companies; but it contradicts DuToit and Pienaar (2005) study which showed that IRR was popular than NPV in their application as investment appraisal techniques. The profitability index model take into account only the relationship between present values of cash inflows and initial cash outlay. The technique does not take into account the characteristics of the chief finance officers (CFOs). Study by graham and Harvey (2001), indicate that CFOs characteristics and size of firms influence the investment appraisal techniques adopted. Larger firms are inclined to sophisticated investment appraisal techniques. Elumilade et al. (2006) for small investment opportunities pay back method were preferred and for large investments firms NPV is preferred.

Table 4.1 Correlation coefficients for Investment appraisal and Investment Alternatives (IA)

		IA	IRR	PI	PBP	ARR	NPV
IA	Pearson Correlation	1					
	Sig. (2-tailed)						
IRR	Pearson Correlation	.831**	1				
	Sig. (2-tailed)	.000					
PI	Pearson Correlation	.768**	.871**	1			
	Sig. (2-tailed)	.000	.000				
PBP	Pearson Correlation	.907**	.913**	.873**	1		
	Sig. (2-tailed)	.000	.000	.000			
ARR	Pearson Correlation	.768**	.814**	.873**	.803**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
NPV	Pearson Correlation	.797**	.863**	.899**	.816**	.920**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	250	250	250	250	250	250

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

The correlation coefficients indicate strong association between the variables; indicating that PBP had highest correlation 0.907** while PI and ARR had lowest correlation 0.768** with the investment alternatives; further the appraisal techniques associate with each other in influencing investment alternative sets for selection or resource allocation.

Table 4.2 model for Investment Appraisal Techniques and investment Alternatives

Model	R	R Square	Adjusted R Square	Change Statistics		
				R Square Change	F Change	Sig. F Change
1	.926[a]	.857	.854	.857	293.094	.000

a. Predictors: (Constant), ARR, PBP, PI, IRR, NPV
b. Dependent Variable: Investment Alternatives

The R equal to 0.926 indicated a strong correlation between investment appraisal techniques and investment alternatives; and R^2= 0.857 measures the proportion of the variation in the dependent variable accounted for by the explanatory variables (investment appraisal techniques). Hence investment appraisal techniques can account for the variation of investment alternatives selection upto 85.7%. It is only 14.3% which remains unexplained. The results indicate a significant relationship between investment appraisal techniques and investment alternatives (F= 293.094, p 0.000< 0.05). The R^2 and Adjusted R^2 indicate the shrinkage of the model, the difference between the two is very small indicating that the model is reliable.

Hypothesis1: $\boldsymbol{H_o}$: *Investment appraisal techniques positively help in the selection of investment alternatives*
In this study ANOVA was used to test the rejection or fail to reject the null hypothesis and the results obtained

are given below

Table 4.3 ANOVA Investment Appraisal Techniques and Investment Alternatives

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	72.658	5	14.532	293.094	.000[a]
	Residual	12.098	244	.050		
	Total	84.756	249			

a. Predictors: (Constant), ARR, PBP, PI, IRR, NPV

b. Dependent Variable: Investment Alternatives

The results indicate a significant relationship between investment appraisal and investment alternatives for selection in the soft drink industry in western Kenya; *F* value = 293.094, *P*= 0.000 < 0.05; the study fails to reject the Null Hypothesis.

Table 4.4 Coefficients[a] for Investment Appraisal Techniques and Investment Alternatives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
		B	Std. Error	Beta			olerance	VIF
1	(Constant)	.682	.091		7.453	.000		
	IRR	-.068	.046	-.102	-1.485	.139	.123	8.106
	NPV	.281	.052	.413	5.439	.000	.101	9.859
	PBP	.457	.030	1.002	15.340	.000	.137	7.288
	PI	-.214	.035	-.415	-6.156	.000	.129	7.751
	ARR	.018	.039	.029	.454	.650	.140	7.149

The study investigated the contribution of each investment appraisal technique towards selection of investment alternatives. Results indicate that the variables *VIF* is greater than 1.0 but less than 10.0 hence multi-colinearity doesn't exist among the variables under investigation. The regression results are as below;

Investment Alternative = $b_0 + b_1$IRR + b_2 NPV + b_3 PBP + b_4 ARR+ b_5 PI+ e (2)

Investment Alternative = 0.682– 0.068 IRR + 0.281NPV + 0.457 PBP + 0.018ARR – 0.214PI (3)

The study results for IRR (-0.068) and PI (-0.214) have a negative contribution to selection of best investment alternatives. NPV, PBP and ARR have a positive contribution to selection of investment alternatives. The coefficients indicate the nature of association of the variable in the model. Further t-test on the degree of significance of the variables was applied. This aimed at testing for the degree of significance of regression coefficients b_0, b_1, b_2, b_3, b_4 and b_5 relating to independent variables towards investment alternatives. For the constant b_0 = 0.682; T_0 = 7.453, the *p* values (p< 0.05) reject H_0 and conclude that b_0 = 0.682 was significantly different from zero. For IRR its b_1 = - 0.068; T_1 = -1.485,(p> 0.05): the study failed to reject H_0 and concluded that b_1 is not significantly different from zero; and not statistically significant, therefore its impact on the selection of investment alternatives was almost zero. PBP values indicated a statistically significant relationship and its impact on investment alternatives was greatest (b_3= 0.457 p<0.05). There was a significant relationship for the contribution of NPV (*p* = 0.00< 0.05), PBP (*p* = 0.000< 0.05) and PI (*p* = 0.00< 0.05) towards investment alternatives; but the relationship was insignificant for IRR (*p* =0.139> 0.05), and ARR (p = 0.650> 0.05).

Table 4.5 Model Summary for ARR, IRR, PI, NPV and Investment Alternatives

Model	R	R Square	Adjusted R Square	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.848[a]	.720	.715	.720	157.198	4	245	.000	.102

Study results reveal that when Pay Back Period technique is not factored in the investment alternatives as one of the regressors; the other regressors (ARR, IRR, PI, and NPV) only account for 72.0% of the investment alternatives selection while 28% remain unexplained. The *F* value also decreased from 293.094 to 157.198. The *R* = 0.848 indicate a strong correlation between the variables but it is not high as when all the five variables were considered.

Table 4.6 Coefficients for ARR, IRR, PI, NPV and Investment Alternatives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.136	.118		1.152	.251		
	IRR	.381	.050	.570	7.663	.000	.207	4.827
	NPV	.138	.071	.202	1.937	.054	.105	9.536
	PI	-.030	.046	-.057	-.646	.519	.147	6.823
	ARR	.102	.055	.168	1.872	.062	.143	7.010

a. Dependent Variable: Investment Alternatives

Further the Beta for the constant decreases from 0.682 to 0.136. The significant relationship exists only on IRR $p< 0.05$ to investment alternatives, this contradicts the earlier result where the relationship is insignificant (IRR; p =0.139> 0.05) when all the regressors are considered. When profitability index is not factored; the results indicate that regressors (ARR, IRR, PBP, NPV) can only account for 83.5% of the variability for investment alternatives (R^2= 0.835) and value of *R* increases from 0.848[a] to 0.914[a] and is better compared to when PBP technique is not considered; in this case the R^2 increases from 0.720 to 0.835 when the contribution of PBP and PI are compared.

Table 4.7 Coefficients[a] for ARR, IRR, PBP, NPV and Investment Alternatives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.800	.096		8.342	.000		
	IRR	-.093	.049	-.138	-1.880	.061	.124	8.048
	NPV	.173	.052	.254	3.316	.001	.115	8.717
	ARR	-.028	.042	-.045	-.665	.506	.145	6.897
	PBP	.393	.030	.863	13.126	.000	.156	6.415

a. Dependent Variable: Investment Alternatives

The results indicate that it is reliable to take into consideration the contribution of ARR, IRR, PBP, and NPV when selecting investment alternatives. The regression coefficients in the model constant increases from 0.682 to 0.800 when all techniques are considered. The result indicate that the constant has a significant relationship (t = 8.342). The model is better as PBP (p <0.05), NPV (p<0.05). The t values for Constant, NPV and PBP are positive and significant. Further, when IRR is not considered in selecting diversification alternatives; the R^2 = 0.856 the regressors (ARR, PI, PBP, NPV) accounts for only 85.6% while 14.4% remain unexplained; this is almost similar to when all investment appraisal techniques are considered and the *F* value (364.024) is higher. It's *R* = 0.925[a] indicating that it is among best set of investment appraisal techniques for diversification alternatives.

Table 4.8 Model Summary for ARR,PI PBP,NPV and Investment Alternatives

Model	R	R Square	Adjusted R Square	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.925[a]	.856	.854	.856	364.024	4	245	.000	.219

Dependent variable: Investment Alternatives

Investment appraisal techniques IRR, PBP, PI and NPV without ARR give best selection of investment alternative; its *F* value (367.507); R^2 (0.857), adjusted *R* square (0.855), and *R* (0.926[a]). This results is similar to R^2 = 0.857 when all regressors are considered without contribution of ARR technique; despite negative contribution of PI and IRR when all techniques were taken into account. Therefore there is minimum contribution of ARR technique towards selection of investment alternatives to firm's investment portfolio. When NPV is not factored in the investment appraisal process the regressors IRR, PI, PBP, and ARR account for only 84% in investment alternatives selection (R^2 = 0.840) and 16% remain unexplained; F value (321.46).This result compared with that when IRR is not factored R = 0.925[a]; R^2 = 0.856 hence the regressors account for 85.6% while 14.4% remain unexplained; and F value (364.024). This finding makes it clear that NPV technique is a superior technique than IRR. This concurs with findings of Burns and Walker (1997) and Ryan and Ryan (2002) that 56% of firms rely on NPV to resolve investment conflicts. Despite the success attached to NPV, in efficient markets, capital rationing influence firms to limit the size of their capital budgeting consequently rejecting positive NPV investments; this may make the firm lose business and fail because of inadequate investment alternative selection. Therefore it is prudent for investors to use investment appraisal techniques IRR, PBP, PI and NPV for best selection of their investments.

Table 4.9 Model Summary for IRR, PI, PBP, ARR and Investment Alternatives

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.916[a]	.840	.837	.23530	.840	321.464	4	245	.000

a. Predictors: (Constant), IRR, ARR, PI, PBP
b. Dependent Variable: Investment Alternatives

The study investigated the influence of investment appraisal techniques on efficient portfolio selection. In this study a portfolio is said to be efficient *iff* it achieves the maximum expected return for a given level of risk.

Table 4.10 Investment Appraisal Mean Rank on Portfolio Efficiency

Investment Appraisal Technique	IRR	NPV	PBP	ARR	PI
Kruskal-Wallis Mean Rank	183.23	190.72	187.91	183.03	182.76
N	250	250	250	250	250

The investment appraisal techniques help rank investment opportunities as per the optimality of their returns. The study results relating to Kruskal-Wallis Test indicate that NPV had the highest mean rank of 190.72, PBP had a mean rank of 187.91; IRR mean rank 183.23, ARR mean rank of 183.03 and least was PI with a mean rank of 182.76.

Table 4.11 Test Statistics[a,b]

	IRR	NPV	PBP	PI	ARR
Chi-Square	189.425	210.493	209.802	190.508	190.262
df	2	2	2	2	2
Asymp. Sig.	.000	.000	.000	.000	.000
Mean Rank					

a. Kruskal Wallis Test
b. Grouping Variable: Portfolio Efficiency

The test statistic results indicate that NPV had the highest Chi-Square values (210.493) followed by PBP (209.802) the least Chi-Square value (189.425) occurred at IRR.

Table 4.12 Correlations of Investment Appraisal Techniques and Portfolio Efficiency

		Portfolio Efficiency	ARR	PI	PBP	NPV	IRR
Pearson Correlation	PORT. EFF.	1.000					
	ARR	.854	1.000				
	PI	.826	.894	1.000			
	PBP	.898	.932	.931	1.000		
	NPV	.882	.916	.865	.903	1.000	
	IRR	.827	.895	.977	.937	.876	1.000
	Sig. (1-tailed)	.	.000	.000	.000	.000	.000

Kruskal-wallis Test: Investment Appraisal Techniques and Portfolio Efficiency

The investment appraisal techniques have a significant relationship with portfolio efficiency ($p< 0.05$). The correlation coefficients indicate that PBP (0.898) is strongly correlated to portfolio efficiency followed by NPV (0.882), ARR (0.854), IRR (0.827) and least was PI with correlation of 0.826.

Hypothesis 2: $\boldsymbol{H_o}$: *Investment Appraisal Techniques positively influence Portfolio Efficiency*
The ANOVA results on investment appraisal techniques and portfolio efficiency were as indicated in Table 4.13

Table 4.13: ANOVA[b] for IRR, NPV, ARR, PBP, PI and Portfolio Efficiency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	155.646	5	31.129	259.641	.000[a]
	Residual	29.254	244	.120		
	Total	184.900	249			

Predictors: (Constant), IRR, NPV, ARR, PBP, PI
Dependent Variable: Portfolio Efficiency

The results indicate a significant relationship between investment appraisal techniques (IRR, NPV, PI, ARR and PBP) and portfolio efficiency (F= 259.64; p 0.000< 0.05*)*. The contribution of each investment appraisal to portfolio efficiency, results indicate that ARR influence portfolio efficiency negatively by magnitude of -0.088; PBP influence portfolio efficiency with highest magnitude (0.525) followed by NPV (0.378); only NPV and PBP have significant influence to portfolio efficiency ($p< 0.05$).

$$PORT.EFF. = b_0 + b_1 ARR + b_2 NPV + b_3 PBP + b_4 IRR + b_5 PI + e \quad (4)$$

$$PORT.EFF. = -0.088 - 0.081\ ARR + 0.378 NPV + 0.525\ PBP - 0.255 IRR + 0.072 PI \quad (5)$$

The results reveal that ARR and IRR negatively influence portfolio selection. Their application in the investment appraisal process decreases portfolio efficiency while the application of NPV, PBP and PI increases portfolio efficiency.

Part analyses of investment appraisal techniques influence on portfolio efficiency different results are observed. When ARR is not factored the portfolio efficiency results indicate that regressors(NPV,IRR,PBP, and PI) have a strong correlation of 0.917[a] and R^2 is 0.841; portfolio efficiency is accounted for upto 84.1% ; the results indicate significant relationship of the variables (F= 323.272; P< 0.05).

Table 4. 14: Coefficients[a] for PI, PBP, NPV and Portfolio efficiency

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.170	.102		-1.662	.098		
	PI	-.131	.061	-.154	-2.161	.032	.130	7.685
	PBP	.458	.056	.675	8.112	.000	.095	10.480
	NPV	.331	.049	.406	6.695	.000	.180	5.567

When both IRR and ARR are not considered in the analysis results (R=0.915; $R^2 = 0.837$; F= 422.578; $p < 0.05$) indicate that regressors (NPV, PBP, and PI) account for 83.7% of the dependent variable while 16.3% remain unexplained. In this case the influence of PI is negative (beta coefficient -0.131).

Table 4.15: Model Summary[b] IRR, NPV, PBP, PI and Portfolio Efficiency

Model	R	R Square	Adjusted R Square	Change Statistics				Durbin-Watson
				F Change	df1	df2	Sig. F Change	
1	.917[a]	.841	.838	323.272	4	245	.000	.127

a. Predictors: (Constant), IRR, NPV, PBP, PI
b. Dependent Variable: Portfolio Efficiency

Part analysis when PI is not factored the regressors(NPV and PBP) indicate a strong correlation of 0.913[a] and its R^2 is 0.834 (the variation of dependent variable is accounted for upto 83.4%); its F value is highest at 622.286, $p<0.05$ indicating that model results are better as regressors have greater influence on portfolio efficiency.

Table 4. 16: Model Summary[b] Pay Back Period and Portfolio Efficiency

Model	R	R Square	Adjusted R Square	Change Statistics				Durbin-Watson
				F Change	df1	df2	Sig. F Change	
1	.898[a]	.807	.806	1037.205	1	248	.000	.098

a. Predictors: (Constant), Pay Back Period
b. Dependent Variable: Portfolio Efficiency

Analyzing only PBP as a regressor to portfolio efficiency, F value increased (F= 1037.205 from 622.286) by a big margin, although its R decreases to 0.898[a]; and R^2 decreases to 0.807; but still the result indicate a significant relationship between PBP and portfolio Efficiency; the study fails to reject the Null Hypothesis. Therefore investment appraisal techniques particularly payback period significantly influence portfolio efficiency in the soft drink industry in western Kenya.

5.0 Conclusion

The study established that investment appraisal techniques select the best investment alternatives in the soft drink industry. From the findings it is clear that techniques IRR, PBP, PI and NPV without ARR contribute better to selection of investment alternative; and on superiority NPV technique is a superior technique than IRR. It is prudent for managers, owners and investors to use techniques IRR, PBP, PI and NPV for investment opportunities selection. The study results showed that investment appraisal techniques have a significant relationship to portfolio efficiency. Results for PBP as an investments appraisal technique significantly influence highly portfolio efficiency. Therefore investment managers should use PBP together with other investment techniques to maximize business solvency for optimal performance in their industry.

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