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Analysis of Strategic Options and Performance of Irrigation Schemes in Kenya: Bura Irrigation Scheme

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ABSTRACT

The main aim of this study was to assess the strategic options for increasing crop performance available in irrigations schemes in Kenya.Specifically the study sought to assesthe influences of; diversification, cost leadership, technology, capacity building and research and development (R&D) strategies on performance of Bura irrigation scheme in Kenya. This study was anchored in Michael Porters generic strategies model, the General Systems' Theory (GST) and the Dynamic Capabilities Theory. The study adopteda mixed research design, which included descriptive and quantitative designs. The target population comprised of 2726 farmers in Bura Irrigation from which 337 respondents were sampled using Mugenda & Mugenda (2003) formula. The study used both questionnaire and interviews to collect data from the respondents. The collected data was analyzed and presented by use of frequency charts, bar graphs and pie charts. Regression analysis wasused to test the relationship between strategic options and performance of Bura irrigation scheme. The issues relating to the ethical conduct of research such as informed consent, confidentiality, privacy and anonymity were upheld. The results of the study showed that the selected strategies improved performance of Bura irrigation scheme. The government should therefore encourage crop diversification and reduce cost of production for the farmers. Allocation of more resources to irrigation schemes may improve crop yields within Kenya leading to sustained food security achievement.

Key Words: Strategic Options, Strategic Management, Irrigation Schemes in Kenya, Bura Irrigation Scheme

1. BACKGROUND

Kenya's economy is agriculture-based, yet over 80 percent of the country is classified as arid and semiarid and typically characterized by low (100-1,200 mm per annum) and erratic rainfall, high evapo-transpiration rates and generally fragile ecosystems (UNDP Kenya , 2005). Irrigation is important to farmers' livelihoods. While the Government of Kenya once provided irrigation facilities to farmers at no cost, this is no longer the case. Farmers now assume a greater, if not the full, investment cost of providing water for their varied uses. In order to meet these costs, farmers need to produce crops that can repay this investment and provide a livelihood for their families (Kull, 2006).

Irrigation infrastructure has been funded in targeted areas in a bid to improve food production and rural economies. Currently, the Kenyan government has been running the operations of the major five public Irrigation Schemes (Bura, Ahero, Perkerra, Hola, Mwea) in different parts of the country through the National Irrigation Board (NIB) (Mutero, 2002). Generally, irrigation activities demands costly continuous operations in terms of supply of water and adequate maintenance of the water distribution and drainage channels. The government, the

private sector, and development partners have funded most of the irrigation structures since it is difficult for smallholders themselves to build such structures (PMU-Kenya, 2004). World Bank (2007) indicated that irrigation projects consume many scarce resources through both recurrent and development expenditure and adversely affect developing countries, whose capacity to set up irrigation infrastructure is limited. This research focused on diversification, cost leadership, technology and capacity building as the independent variables.

2. STATEMENT OF THE PROBLEM

The irrigation sub-sector is currently facing many challenges. These include, low rate of irrigation infrastructure development; inadequate funding for development and investment by public and private sector; and poorly developed marketing channels and irrigated commodity value chain (Chema, 2003). Further, the policy, legal and regulatory frameworks have not been reviewed to reflect the emerging operational and socioeconomic realities, while low budgetary allocation has constrained service provision by key institutions (KARI, 2005). These Bura settlers and their families suffer abject poverty and drought and famine are a daily reality. The project has also led to the destruction of evergreen floodplain forests, which were rich in plant and animal species. The area is now reminiscent of a ghost town. Huge water towers stand abandoned in the scrubby landscape; irrigation canals stretch across tens of miles, overgrown with thorny vegetation; and a fenced- in vehicle parking lot contains dozens of rusting Land Rovers and large farm machinery. Housing units built for mid-level project staff as well as the villas for the resident managers' stand abandoned, dilapidated and looted. Only people with nowhere left to go remain on the project site. They are a community of about 20,000 former herders who sold their cattle, and farmers who left more fertile areas of the country for the promise of irrigated agricultural land (Burt, 2009).

Water is a severe problem in the Bura project. Today the only source of water in the area is a murky irrigation reservoir that serves both people and cattle. Large plastic canisters filled with the brownish water from the reservoir are strapped to children's foreheads as they wind their way under a torching sun through thorny scrubs to their homes. Their mothers spend much of the day walking through shadeless heat searching for firewood. Food must be supplied by the United Nations World Food Program. Malnutrition and disease are rampant, especially among the children. The Bura project initially planned to build 20 village health units and various health centers, but these were canceled. There are other studies based on the relationship establish the strategic options and performance of Irrigation Schemes in Kenya. However, these studies are not carried out in Bura Irrigation Scheme hence they are different from the present study in its focus and scope. Furthermore, there is no evidence of a study focusing on the same in Bura Irrigation Scheme. It is against this background that the researcher has embarked to establish the strategic options and performance of Bura Irrigation Scheme in order to fill the existing knowledge gap.

3. OBJECTIVES OF THE STUDY

i. To analyze the effects of crop diversification on performance in Bura Irrigation Scheme.

ii. To assess the effect of cost on performance in Bura Irrigation Scheme.

iii. To evaluate the effect of technology on performance in Bura Irrigation Scheme.

iv. To explore capacity building effects on performance in Bura Irrigation Scheme.

v. To analyze the effects of research and development on performance in Bura Irrigation Scheme.

4. THEORETICAL REVIEW

Scholars and researchers have produced comprehensive theories based on strategic options and performance of Irrigation Schemes .Their aim was to provide a framework for understanding, not just the factors influencing such attitudes, but also why it results in such effects (Baron & Greenberg; 2003).

4.1 The Porter's generic strategies

Porter's generic strategies describe how a company pursues competitive advantage across its chosen market scope. There are three generic strategies, either lower cost, differentiated, or focus. A company chooses to pursue one of two types of competitive advantage, either via lower costs than its competition or by differentiating itself along dimensions valued by customers to command a higher price. A company also chooses one of two types of scope, either focus (offering its products to selected segments of the market) or industry-wide, offering its product across many market segments. The generic strategy reflects the choices made regarding both the type of competitive advantage and the scope. The concept was described by Porter (1980). Porter (1980) called the generic strategies "Cost Leadership" (no frills), "Differentiation" (creating uniquely desirable products and services) and "Focus" (offering a specialized service in a niche market). He then subdivided the Focus strategy into two parts: "Cost Focus" and "Differentiation Focus."

This theory is based on the concept that there are five forces that determine the competitive intensity and attractiveness of a market. These forces help to identify where power lies in a business situation. This is useful both in understanding the strength of an organization's current competitive position, and the strength of a position that an organization may look to move into **(**Walter, 2010). Supplier power**:** An assessment of how easy it is for suppliers to drive up prices. This is driven by the number of suppliers of each essential input, uniqueness of their product or service, relative strength of the supplier and cost of switching from one supplier to another. Buyer power: An assessment of how easy it is for buyers to drive prices down. This is driven by the number of buyers in the market, importance of each individual buyer to the organization, and cost to the buyer of switching from one supplier to another. Competitive rivalry**:** The main driver is the number and capability of competitors in the market. Many competitors, offering undifferentiated products and services, will reduce market attractiveness. Threat of substitution**:** Where close substitute products exist in a market, it increases the likelihood of customers switching to alternatives in response to price increases. This reduces both the power of suppliers and the attractiveness of the market. Threat of new entry: Profitable markets attract new entrants, which erodes profitability. Unless incumbents have strong and durable barriers to entry, for example, patents, economies of scale, capital requirements or government policies, then profitability will decline to a competitive rate.

This theory was useful to this study because the management of National Irrigation Board will use Porter's five forces framework when making a qualitative evaluation of a Bura Irrigation Scheme's strategic position. The study used Porter's five forces to understand whether new products or services are potentially profitable. By understanding where power lies, the theory can also be used to identify areas of strength, to improve weaknesses and to avoid mistakes. Five forces analysis would also help NIB to understand the factors affecting profitability in the Irrigation Schemes, and guide to inform decisions relating on whether to increase its capacity and or developing competitive strategies. The NIB's relative position within its industry determines whether Irrigation Scheme profitability is above or below the industry average. The fundamental basis of above average profitability in the long run is sustainable competitive advantage. There are two basic types of competitive advantage

Irrigation Scheme can possess: low cost or differentiation. The two basic types of competitive advantage combined with the scope of activities for which Bura Irrigation Scheme seeks to achieve them, lead to three generic strategies for achieving above average performance in an industry: cost leadership, differentiation, and focus. The focus strategy has two variants, cost focus and differentiation focus.

4.2 Leadership Theory

In cost leadership, Bura Irrigation Scheme will set out to become the low cost producer in its industry. The sources of cost advantage are varied and depend on the structure of the industry. They may include the pursuit of economies of scale, proprietary technology, preferential access to raw materials and other factors. A low cost producer must find and exploit all sources of cost advantage (Porter & Kramer; 2011). If Bura Irrigation Scheme can achieve and sustain overall cost leadership, then it will be an above average performer in its industry, provided it can command prices at or near the industry average.

4.3 General Systems Theory

Systems theory or systems science is the interdisciplinary study of systems in general, with the goal of discovering patterns and elucidating principles that can be discerned from and applied to all types of systems at all nesting levels in all fields of research. It was established as a science by Ludwig von Bertalanffy, AnatolRapoport, Kenneth E. Boulding, William Ross Ashby, Margaret Mead, Gregory Bateson and others in the 1930's. Systems theory, in its trans disciplinary role, brings together theoretical principles and concepts from ontology, philosophy of science, physics, biology and engineering. (Skyttner, 2001).

Large-scale multiple system intervention methods have been gaining in popularity since the late seventies. The interest in the quality of working life (QWL) is primarily responsible for this popularity. This approach places strong emphasis on designing innovative techniques that serve as a catalyst for change. Assessment of change is a major theme that has emerged as a result of the large-scale multiple system intervention methods. NIB can asses change by use of models of assessment, instruments for measuring organizational change, the development of time-series models, and an overall increase in the use of multivariate analysis for the testing and evaluation of change.The examination of failures provides us with valuable information about organizational change. It forces us to focus on the theoretical constructs of change. By comparing successful and unsuccessful attempts at implementing change, we can evaluate the effectiveness of various techniques.

This theory is useful in this study because on issues involving social change, NIB can use the General systems theory framework in perceiving, analyzing, and acting in solving strategic problems. Furthermore, the management will use the Human systems management in the study of the interaction between decisions made and the system, plus the impact of environmental influences, may be important. Management implies control, and control of systems or sub-systems is essential to organized daily and on-going life. VSM will also enable NIB to understand the complexity of the organizational structure, the degree of centralization/decentralization and analyze the organization's stability, control, and coordination characteristics, and eventually redesign it.

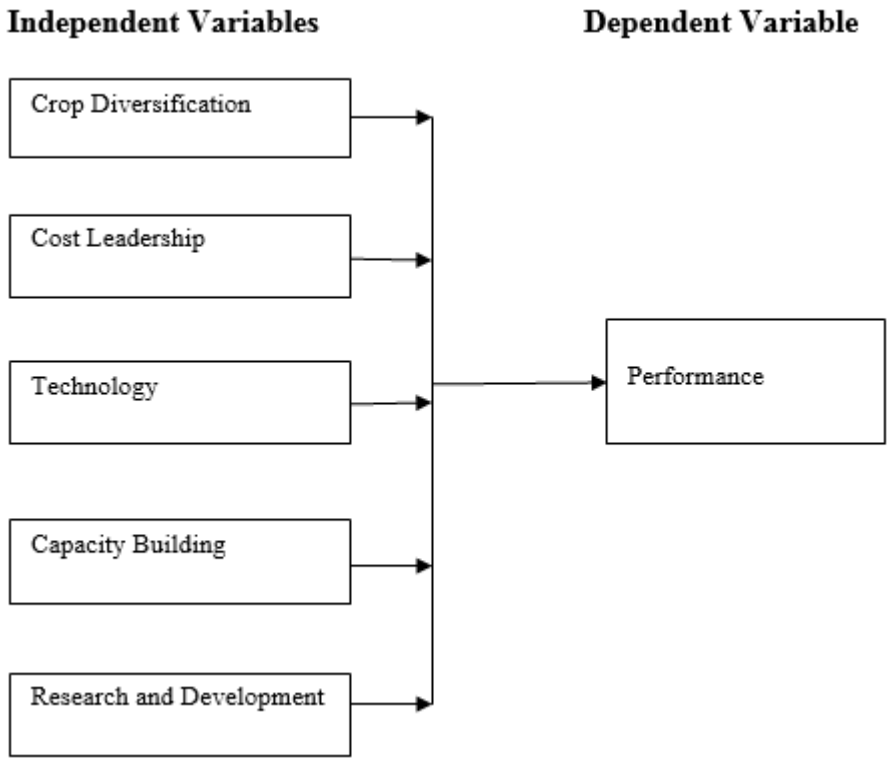
5. EMPIRICAL REVIEW

Gomes and Livdan (2004) found out that the diversification leads to the firm's growth and allows the firm to explore markets. Bowen and Wiersema(2005) suggested that, if strategy research is to continue to offer valuable guide lines on the strategic behavior of firms it seems to have clear understanding of the factors influencing a firm's choice of diversification strategy and how this evolves in response to changing business conditions. Daud, Salamudin

and Ahmed (2009) described that diversification will lead accounting measures of performance of the firms. Meanwhile, the market measures of performance are very much sensitive to the level of leverage in the firm. According to what the Palepu and Healy (2008), a firm may produce a relative low profit margin by adopting the strategy of cost leadership. Cost leadership strategy helps firms to produce the standard, high-volume product or service at the most competitive price to customers (Wiley &Sons, 2003). Lahtinen andToppinen (2006) in their report, found out the cost-leadership indicators, statically, explain better on the short-term financial performance, than value added creation, which has affection on longer-term financial performance and turnover growth in the future. They concluded that, cost efficiency is a prerequisite for the business, and the latest worldwide economic recession is just the best example to confirm the validity. Meanwhile, the value-added creation is a necessity to support the economic sustainability of the business.

Valipour and Birjandi (2012) if the company's strategy is based on cost leadership strategy, with increase in financial leverage and Dividend payments, the performance will be increased. The financial leverage multiplication strategy variable has inversely relationship with company's performance (Aulakh; 2000). Tsai (2004) argues that a firm with a product development process faster than the competition can get first in the market and ensure good economic returns. According to Cole (2002), the training policy of an organization may include a range of policies dealing with human resources. The policy statement sets out what the organization is prepared to do in terms of developing its employees and it must support the organizational mission, goals and strategies. Gupta (1999) suggested that even when training is the cause of the under-performance problem, the right training must be implemented.

6. CONCEPTUAL FRAMEWORK



7. RESEARCH METHODOLOGY

This study used both descriptive and quantitative research designs to determine the relationship between the dependent and the independent variables and to establish any association between them. The list of respondents was provided by the Human Resources Department of NIB. The Target population of this study consisted of 2726 farmers in Bura Irrigation scheme This study adopted a questionnaire with both closed ended and open ended questions for the purpose of collecting data.

8. RESEARCH FINDINGS

8.1 Correlation Analysis

The results for each variable in this study is given by the Spearman's Rho (r) and its corresponding p-value. If the p-value is less than 0.05, then the relationship/influence is statistically significant.

Table 1: Strategic Influence on the Performance: Bivariate Linear Correlation

		Y	X_1	X_2	X_3	X_4	X_5
Performance (Y)	Pearson Correlation	1					
	Sig. (2-tailed)						
Diversification X_1	Pearson Correlation	.468**	1				
	Sig. (2-tailed)	.000					
Cost Leadership X_2	Pearson Correlation	.429**	.442**	1			
	Sig. (2-tailed)	.000	.000				
Technology X_3	Pearson Correlation	-.014	.334**	.325**	1		
	Sig. (2-tailed)	.800	.000	.000			
Capacity Building X_4	Pearson Correlation	.311**	.293**	.377**	.373**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
R&D X_5	Pearson Correlation	.227**	.424**	.305**	.516**	.363**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

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

The study results in Table 1 shows the bivariate linear correlations among the key variables influencing the performance of irrigation schemes in Kenya. The study revealed that diversification (X_1) has a positive and significant influence on the performance of irrigation schemes (r =.468**, *P*< .001). Diversification as a strategy has been identified by the literature as one of the key variables influencing performance of organizations in Kenya and all over the world today. The implication here is that as the irrigations schemes employ

diversification of crops as a strategy, there is a significant positive change in the performance of the irrigation scheme. This study also found a positive and significant influence of cost leadership (X_2) on the performance of irrigation schemes in Kenya ($r = .429^{**}$, $P < .001$). This implies that as the management of irrigations schemes adopts cost leadership as a strategy, the performance of the irrigation scheme significantly improves.

The bivariate linear correlations analysis also revealed that there is a positive and significant influence of capacity building as a strategy on the performance of irrigation schemes in Kenya ($r = .311^{**}$, $P < .001$). The literature identified capacity building as one of the key variables positively influencing performance of many organizations today. The findings of this study support this observation. Research and Development strategy was found to have a positive and significant relationship with performance of irrigation schemes ($r = .227^{**}$, $P < .001$).This implies that as the organizations undertake more researches on their products and offerings, the performance increases positively. However, this study failed to find any significant influence of technology on the performance of irrigation schemes in Kenya ($r = -.014$, $P = .0800$). The findings in this study indicated that compared to the other three predictor variables influencing performance of irrigation schemes in Kenya, the diversification strategy has the strongest and significant influence on performance of irrigation schemes. Cost leadership, capacity building and R&D come second, third and fourth respectively.

8.2 Multivariate Regression

The main model under investigation in this study intended to establish the combined influences of the five key variables (diversification, cost leadership, technology, capacity building and R&D) on the performance of irrigation schemes in Kenya. A multiple regression analysis was performed on the five predictor variables (Diversification, Cost Leadership, Technology, Capacity Building and R&D) to test their combined influence on the performance of irrigation schemes in Kenya. The regression output in Table 12 containing all the five variables in this study was found to be valid ($F_{(5,330)} = 39.309$, $P < .001$) meaning that all the five key strategies in this study are good predictors explaining the variations in performance of irrigation schemes in Kenya.

Table 2: Strategic Influence on the Performance: ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	81.546	5	16.309	39.309	.000[b]
	Residual	136.915	330	.0415		
	Total	218.461	335			

a. Dependent Variable: Y

b. Predictors: (Constant) X_5 ,X_4,X_3, X_2, X_1

The results of regression analysis in Table 2 indicated significant influences of the five predictor variables on the performance of irrigation schemes in Kenya. The coefficient of determination (R-squared) of 0.373 shows that 37.3% of the total variations in performance of irrigation schemes can be explained by the five predictor variables in this study that is (Diversification, Cost Leadership, Technology, Capacity Building and R&D). The adjusted

R-squared of 0.364 indicates that the five predictor variables in the absence of the constant value explainsthe change in performance of irrigation schemes by 36.4%. The remaining percentage (63.6%) is explained by the factors excluded in the multiple regression model under investigation in this study. The standard error of estimate (0.64412) shows the average deviation of the independent variables from the line of best fit.

Table 3: Strategic Influence on the Performance: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.611[a]	.373	.364	.64412

a. Predictors: (Constant), X_5 ,X_4,X_3, X_2, X_1

The multiple regression's results in Table 3 indicates that all the five predictor variables influencing performance of irrigation schemes under investigation in this study that is diversification (X_1: β_1 = .402, *P*< .001), Cost Leadership (X_2: β_2 = .488, *P*< .001), Technology (X_3: β_3 = -.459, *P*< .001) and Capacity Building (X_4: β_4 = .162, *P*< .001) are significant and positively influences the performance of irrigation schemes in Kenya. However, the influence of R&D in a combined relationship was found to be statistically insignificant. The constant in this model (β_0) is positively and significantly related to performance of the irrigation scheme (β_0 = .876, *P*< .001).

Table 4: Strategic Influence on the Performance: Regression Coefficientsa

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.876	.186		4.711	.000
	X_1	.402	.057	.368	7.080	.000
	X_2	.488	.093	.270	5.271	.000
	X_3	-.459	.070	-.346	-6.529	.000
	X_4	.162	.042	.195	3.901	.000
	X_5	.105	.059	.096	1.762	.079

a. Dependent Variable: Y

The value of the constant (β_0 = .876, *P*< .001) indicates that performance of irrigation schemes in Kenya will always exist at a certain minimum even without the five predictor variables under investigation in this study. The coefficient of X_1 that is (β_1 = .402, *P*< .001) indicates that a unit increase in diversification strategy index leads to an increase in performance of irrigation scheme's index by .402 which is statistically significant (*P*< .001).

Similarly, the coefficient of X_2 (β_2 = .488, P< .001) shows that a unit increase in cost leadership strategy's index leads to an increase in irrigation scheme's performance index by .488 which is also statistically significant (P< .001). The coefficient of X_3 (β_3 = -.459, P< .001) indicates that a unit decrease in technology's strategy index leads to an increase in irrigation's scheme performance index by .459 which is statistically significant (P< .001). Lastly, the coefficient of X_4 (β_4 = .162, P< .001) indicates that a unit increase in capacity building strategy's index leads to an increase in irrigation's scheme performance by 0.162 which is also statistically significant (P< .001). The influence of R&D in a combined relationship was found to be statistically insignificant. In summary, it therefore follows that, this study found statistical and significant evidence that the diversification, cost leadership, technology and capacity building, in a combined relationship, positively and significantly influences the performance of irrigation schemes in Kenya. The study results of the bivariate linear correlations in Table 4.10 and multiple regression analysis were used to test the objectives and answer the research questions set in Chapter One.

9. CONCLUSION

This study found a positive and significant influence of the selected strategies and performance of irrigation schemes in Kenya. This study found out that all the strategies under investigation in are positively and significantly related to performance. It therefore, follows that deliberate efforts to improve the working strategies by the farmers in the irrigation schemes and the government will enhance and improve the productivity and the overall performance of irrigation schemes in Kenya.

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