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Influence of Material Capability on Competitive Advantage of Sugar Companies in Western Kenya

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Abstract

There is great interest by the manufacturing firms in material capability due to the multiplier benefits arising out of effective and efficient material management. The Resource based view theory states that the resources possessed by a firm are the primary determinants of its performance and Porter's diamond theory suggests that the national material base of an organization plays an important role in shaping the extent to which it is likely to achieve advantage on a global scale. Out of 88 questionnaires sent out, 64 usable questionnaires were received giving a response rate of 73%. Descriptive statistics was used to test the objectives, chi- square test were used to test the hypotheses and correlation analysis was used to determine the direction and magnitude of the relationship between material capability and competitive advantage. The findings are that the material capability influences competitive advantage of sugar companies in Western Kenya. From the study it can be concluded that companies under study have material capability limitations resulting in a vicious circle of sugarcane glut and scarcity. The study recommends that for manufacturing firms to experience remarkable success in their performance, priority must be given to Materials Management as a total concept. Further research should be carried out on the influence of material capability on competitive advantage of the private owned sugar companies in Kenya.

Key Words: Materials capability, Competitive Advantage.

Introduction

A firm's strategy selection is based on the careful evaluation of its resource and capability portfolios and reflects the market influence (Barney, 1991). An estimated 25 percent of Kenya's population depends directly or indirectly on the sugar industry for their livelihood (KSB, 2010). Smallholder farmers supply over 92 percent of the sugarcane processed by sugar companies, while the remainder is supplied by factory-owned nucleus estates (KSI, 2009; KSB, 2010). The sugar firms are the "life-line" of surrounding towns and most farmers in Western part of Kenya rely on sugarcane as the only major source of income (ActionAid International Kenya, 2005). The industry is under constant threat of collapsing due to perennial challenges (Institute of Economic Affairs, 2005). Odek, Kegode, and Ochola (2003) indicate that amongst the problems affecting the millers is inefficient factory operations. Average sugarcane yield for the sugar industry in Kenya in 2013 was 54.67 tonnes per hectare nearly half as much as Zambia whose yield is 113 tonnes per hectare and Malawi producing 105 tonnes per hectare (KSB, 2013). Kenya is expected to open up its markets to sugar from COMESA region from March 2019. The focus of the study is on Muhoroni, Chemelil, Mumias, Nzoia, South Nyanza, and West Kenya Sugar companies due to the economic importance of sugarcane and very high population density in Western Kenya.

Materials Capability

Material capability may be defined as the ability to plan and to continuously receive enough material for full factory capacity utilization over an extended period of time (Zimmermann & Zeddies, 2002). Sugarcane which is the main material requirement in the sugar industry is determined by the sugarcane husbandry, harvesting and delivery practices. In sugarcane growing country settings, farmers and processors establish interlinked contract and this enables farmers to access credit, inputs and guaranteed purchases. Such agreements benefit the processing companies through guaranteeing higher quality and quantity of sugarcane and timely delivery. Government exercises some control on the supply chain and hence the sugar firm must develop its supply chain strategies to stay competitive in the changing environment (Chidoko & Chimwai, 2011). A study carried out on cane farming in Lake Victoria basin by Waswa, Onyango, & Mcharo (2012) found out that yield appears to be a key determinant of gross income to farmers.

Competitive Advantage

The international competitiveness of sugar industry expresses the ability of domestic firms to compete with foreign firms. According to Porter (1980) agribusiness become more competitive through cost leadership and /or product differentiation. The success of a competitive firm can be measured by both objective and subjective criteria. Objective criteria include return on investment, market share, profit and sales revenue, while subjective criteria include enhanced reputation with customers, suppliers, and competitors, and improved quality of delivered services (Barney, 2002).

Statement of the Problem

The Kenya sugar industry faces collapse due to poor agronomic practices, low sugarcane yield and poor road infrastructure putting at stake the survival of an estimated 25 percent of Kenya's population who depend directly or indirectly on the industry for their livelihood. The problems affecting the Kenya Sugar industry include inefficient agronomic practices. Average sugarcane yield in Kenya in 2013 was 54.67 tonnes per hectare compared to Zambia whose yield is 113 tonnes per hectare and Malawi 105 tonnes per hectare Low sugarcane yield leads to sugarcane scarcity, scramble by the millers for the little sugarcane available, low factory capacity utilization and financial constraints. This low yields reduces the profit to farmers and discourages some farmers to vacate sugarcane farming. Low yield means that bigger land cultivation is required to realize the required quantity of sugarcane. Very few empirical studies have been carried out on the influence of sugarcane capability on competitive advantage of sugar companies in Kenya. This research intends to fill this gap by empirically assessing the influence of material capability on competitive advantage of sugar companies in Kenya.

Research Objectives

The specific objective of the study is to establish the influence of material capability on competitive advantage in sugar companies in Western Kenya.

In answering the objective, the study also sought to test the hypothesis:

H_{01}: There is no significant relationship between material capability and competitive advantage of sugar companies in Western Kenya and

Theoretical Framework

The competitiveness of a firm in this study can be analyzed using the Resource Based View and Porter's diamond theories.
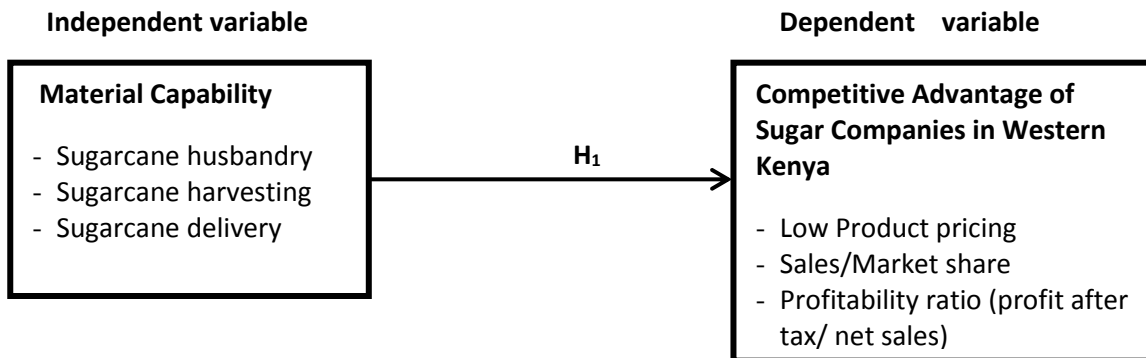
Resource based View Theory

The Resource Based View theory stipulates that the resources possessed by a firm are the primary determinants of its performance, and these may contribute to a sustainable competitive advantage of the firm (Wernerfelt, 1984). The origins of the Resource-based theory (RBV) can be traced back to earlier works by Penrose (1959). Penrose recognized the importance of resources to a firm's competitive position. Barney and Wernerfelt are the major proponents of the RBV theory. Wernerfelt (1984) defined resources as those tangible and intangible assets which are tied semi- permanently to the firm. As noted by Barney (1991), firm's resources include all assets, capabilities, organizational processes, firm's attributes, information and knowledge, controlled by a firm that enable the firm to conceive and implement strategies that improve its efficiency and effectiveness. The resource based view deals with the competitive environment facing the organization and takes an "inside - out" approach.

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Porter's Diamond Theory

The diamond model is an economical model developed by Porter (1990) in his book "The Competitive Advantage of Nations". Porter's model takes the industry structure (outside – in) as its starting point. It states that the national home base of an organization plays an important role in shaping the extent to which it is likely to achieve the competitive advantage on a global scale. This model consists of four national determinants of competitive advantage: factor conditions (human resources, material resources, knowledge resources, capital resources, and infrastructure), demand conditions (home demand for products and services produced in a country), related and supporting industries (existence or non-existence of internationally competitive supplying industries and supporting industries) and firm's strategy, structure and rivalry (conditions in a country that determine how companies are established, organized and managed, and that determine the characteristics of domestic competition).

Conceptual framework

The study was guided by the conceptual framework in figure 1. The independent variable is the material capability and the dependent variable is the competitive advantage.

Independent variable   **Dependent   variable**

Material Capability - Sugarcane husbandry - Sugarcane harvesting - Sugarcane delivery	H_1 →	**Competitive Advantage of Sugar Companies in Western Kenya** - Low Product pricing - Sales/Market share - Profitability ratio (profit after tax/ net sales)

Figure1: Conceptual framework of Material Capability on Competitive Advantage of Sugar Companies

Literature Review

Material capability is the independent variable and the dependent variable is the competitive advantage.

Unam (2012) carried out a research whose objective was to examine the relationship between Materials Management and success of manufacturing firms. Data was collected through a structured questionnaire, supported by interview. Using Chi-square (χ2) test of independence, the results provided evidence of a positive significant relationship between efficient Materials Management and firm success. This study showed that for manufacturing industries to experience remarkable success in their performance, priority must be given to Materials Management as a total concept. Miguel and Brito (2011) found out that there was a positive

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relationship between Supply Chain Management (SCM) implementation and operational performance in terms of cost, flexibility, quality and delivery. A convenience sample of Brazilian companies was used and a survey research design was used to collect data. The findings were that SCM can be thought of as a source of competitive advantage, reducing costs and improving flexibility, delivery and quality simultaneously.

Chellaswamy and Revathi (2013) research on Growth and Productivity of Indian Sugar Companies revealed that the relationship between materials and other independent variables contributed 99 percent on dependent variable of the companies which started after green revolution period. A Convenience sampling technique was adopted and secondary data from various journals and magazines was also used. Out of 119 companies, 34 companies which had financial data available for a continuous period of 10 years from 2001-2002 to 2010-2011were included in the study. Multiple Regression analysis was used to ascertain relationship of variables at 5% level of significance. Material accounts for nearly 80 percent of cost of production and therefore proper planning; purchasing, handling and accounting of material are of great importance. Akpan, Akpan, Udoka, and John (2013) research on the physical capacity utilization rates in the sugar industry in Nigeria in the period 1970 to 2010 revealed that the physical capacity utilization rates in the sugar industry was influenced by the industry's labour productivity, per capita real GDP, sugar import, federal government expenditure on the sugar industry and the quantity of domestic sugarcane used in sugar production. The regression analysis showed that the sugar industry in Nigeria was demand unconstrained but resource constrained. The study used data collected from two out of four sugar producing firms and macro-economic data from 1970.

Research Methodology

The research was a descriptive cross sectional and correlational designs. The population consisted of 727 senior and middle level managers working in Muhoroni, Chemelil, Mumias, Nzoia, South Nyanza and West Kenya Sugar Companies. Yamane (1967) formula at 95% confidence level and precision level of plus-minus 10% was used to arrive at the sample size of 88 respondents and Baker (1994) 10% of the sample size was used to arrive at 9 respondents for pilot testing of the 5-point Likert scale questionnaire for validity and reliability. Descriptive statistics was used to summarize primary data to enable meaningful description. Log linear formula was used for achieving the objectives.

Ln $(Y_i) = \beta_0 + \beta_1 X_1 + \varepsilon$, where Y_i is the competitive advantage; X_1 is the material capability; β are constants and ε is the error term. Correlation analysis was used to determine the relationship and magnitude between the variables and Chi-square for hypothesis testing at SL= 0.0 5% and CL95%.

Results and Discussion

Out of 88 questionnaires sent out, 64 questionnaires were received representing a response rate of 73%. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting. The item mean Likert values of 1 to 2.4 refers to disagreement of the respondents to the stated statement, 2.5 to 3.4 refers to the respondents being undecided and 3.5 to 5 refers to the respondents agreeing with the statement. The respondents were requested to select the statements which reflect their opinions level of agreement with the statements. 5= Strongly Agree; 4=Agree; 3=Neutral; 2= Disagree; 1 =Strongly disagree, M= Mean and Std= Standard deviation, f= frequency of respondents and % = Percentage.

Table 1: Results of sugarcane husbandry, harvesting and transport

S/N	Statement		5	4	3	2	1	M	Std
a)	Extension staffs monitor farmers' activities and advise them on good husbandry methods in order to promote optimal sugarcane yield.	%	23.4	50	15.6	9.4	1.6	3.84	1.03
		f	15	32	10	6	1		
b)	Land preparation, seed cane and fertilizers supplies are provided on time in order to enhance sugarcane yield.	%	17.2	34.4	17.2	26.6	4.7	3.33	1.24
		f	11	22	11	17	3		
c)	The firm invests in Research and Development in order to improve sugarcane husbandry.	%	31.3	37.5	10.9	7.8	12.5	3.67	1.33
		f	20	24	7	5	8		
d)	The Company matches sugarcane availability projections to factory crushing capacity for effective sugarcane development	%	25	43.8	4.7	20.3	6.3	3.61	1.20
		f	16	28	3	13	4		
e)	The Company does annual replanting of sugarcane to replace fallow farms in order to secure sugarcane availability	%	23.4	48.4	20.3	3.1	4.7	3.75	0.96
		f	15	31	13	2	3		
f)	Harvesting program is used to control sugarcane age and sites to be harvested.	%	28.1	43.8	17.2	7.8	3.1	3.86	0.96
		f	18	28	11	5	2		
g)	The organization does block cane	%	21.9	34.4	17.2	17.2	9.4	3.42	1.30

								Mean	SD
	harvesting in order to facilitate maximum fleet productivity	f	14	22	11	11	6		
h)	The organization frequently holds seminars for cane cutters in order to improve quality of sugarcane harvesting.	%	20.3	35.9	17.2	17.2	9.4	3.34	1.34
		f	13	23	11	11	6		
i)	The organization has an incentive scheme other than task-based pay for cane cutters to encourage good sugarcane harvesting.	%	7.8	15.6	18.8	37.5	20.3	2.66	1.30
		f	5	10	12	24	13		
j)	The Company has established strategic fleet for sugarcane transport to ensures delivery of the right quantity of sugarcane to the factory	%	23.4	43.4	7.8	17.2	7.8	3.66	1.19
		f	15	28	5	11	5		
k)	The Company has efficient transport system in order to ensure optimal delivery of sugarcane to the factory	%	26.6	39.1	7.8	25	1.6	3.66	1.14
		f	17	25	5	16	1		
l)	Company uses high capacity sugarcane transport facility to optimize sugarcane delivery to the factory	%	17.2	26.6	10.9	32.8	12.5	3.14	1.34
		f	11	17	7	21	8		
m)	The Company has established trans loading facilities to optimize sugarcane delivery to the factory	%	34.4	17.2	20.3	23.4	4.7	3.03	1.49
		f	22	11	13	15	3		
n)	Cane harvesting program is used to maximize fleet productivity.	%	25	50	10.9	9.4	4.7	3.95	1.25
		f	16	32	7	6	3		
Mean of Means								**3.50**	**1.15**

Likert items from a to e represent sugarcane husbandry. The mean of means of 3.64 for sugarcane husbandry indicates that the sugar firms are putting in effort to ensure adequate supply of sugarcane to the mills. This effort is not enough and the industry is encouraged to pull up their socks to bring the mean to a value above 4.5 if they have to get sustainable material capability. The value of 3.64 for Kenya sugar industry leads to observation by Akpan, Akpan, Udoka, and John (2013) in Nigerian Sugar Industry which was resource (sugarcane) constrained. Good farmer management results in good sugarcane husbandry, high sugarcane yields and a motivated farmer who is enthusiastic to continue with sugarcane farming due to the lucrative

returns. This encourages more people to enter into sugarcane farming ensuring optimal material availability for the firm and this is beneficial to both the farmers and the company. Chidoko & Chimwai (2011) noted that if farmers do not receive good extension services they are likely to incur very high costs of production and lower output per unit of land area and eventually abandon sugarcane farming. Late delivery of seed cane meant that the farmer had to redevelop the land before planting resulting in extra costs. Late delivery of fertilizer results in lower yield and eventually reduced returns to the farmer.

Better sugarcane yield is determined by the farm activities being carried out at an appropriate time. Waswa, Onyango, & Mcharo (2012) found out that sugarcane yield per hectare was a key determinant of gross income to farmers. Drop in income to farmers is likely to cause discontent and demoralize farmers from continuing with the sugarcane business. Research is critical for sugarcane husbandry as it provides actions to be pursued for optimum sugarcane yields. Sugarcane glut leads to over mature sugarcane, delayed harvesting of sugarcane causing revenue losses to farmers, losses to the company due to court awards arising out of the farmers suing the company for over mature sugarcane or un-harvested sugarcane, dissatisfied farmers uprooting their sugarcane and the eventual result of sugarcane shortage.

The Likert items from f to i represent sugarcane harvesting. The mean of means of 3.32 for sugarcane harvesting showed that the respondents were undecided in this area of sugarcane harvesting. Harvesting program leads to good company image, orderly activity operations, farmers' understanding of when their sugarcane will be harvested and eliminates lobbying by farmers for their sugarcane to be harvested. It is expensive and takes more time to transport sugarcane cutters and sugarcane loaders to scattered sites and reduces sugarcane delivery. Lack of seminars and incentive scheme to sugarcane cutters causes poor sugarcane harvesting leading to poor sprouting of young sugarcane and eventual decline in yield.

The Likert items from j to o represent sugarcane transport. The mean of means for sugarcane transportation to the factory was 3.51 indicating challenges in the sugar industry for ensuring optimal delivery of sugarcane to the factory. Late transport of harvested sugarcane results in the farmer losing on weight due to dried sugarcane and the company extracts less sugar due to sugarcane staleness. The mean of means of 3.5 for material capability (sugarcane husbandry, harvesting and transportation) indicates that the industry was not in the comfortable zone. More effort by the industry is required in order to reach at least a mean of 4.5 to ensure sustainable material capability. The study results validate Unam (2012), Miguel and Brito (2011), Chellaswamy and Revathi (2013) and   Akpan, Udoka, and John (2013) that through materials availability, a manufacturing firm increases profitability.

Logit Regression Analysis

The study conducted a logit regression analysis to measure the relationship between the independent and the dependent variable as per objective by estimating the probabilities using the logit function. The capability was categorized into two: 0-weak and 1-strong. The competitive advantage was binary: 0-not competitive and 1-competitive. The output of the analysis is presented in table 2 and fitted into a model.

Table 2: Logit results for the materials capability

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Material Capability	1.449	.537	7.293	1	.007	4.259	1.488	12.192
Constant	-.938	.393	5.695	1	.017	.391		

Odds of competitiveness of sugar companies = -0.938 + 1.449x_1 + 0.93,   Where

β_0 = - 0.938 is the constant

x_1 is Material capability

0.93 is the error term (SE) from the logit model.

The objective of the study was to establish the influence of material capability on competitive advantage in sugar companies in Western Kenya. The logit analysis results showed that companies that had strong material capability were 4.259 times more likely to be competitive compared to those that had weak material capability.

Correlation analysis

The correlation strengths were interpreted using Cohen (1988) decision rules where 0.1 to 0.3 indicated weak correlation, 0.31 to 0.5 indicated moderate correlation strength and greater than 0.5 indicated a strong correlation between the variables. The results of the correlation analysis are presented in table 3.

Table3: Correlation results of material capability and competitive advantage

		Material Capability	Competitive Advantage
Spearman's rho	**Material Capability** — Correlation Coefficient	1.000	.345**
	Sig. (2-tailed)	.	.003
	n	64	64
	Competitive Advantage — Correlation Coefficient	.345**	1.000
	Sig. (2-tailed)	.003	.
	n	64	64

**. Correlation is significant at the 0.05 level (2-tailed).

Correlation results in table 3 establishes that there is a moderate positive correlation between material capability and competitive advantage r=0.345, p=0.003, CL=95% (2-tailed). This means that if the companies enhanced their material capability then the competitive advantage would significantly be enhanced.

Hypotheses testing

The study tested the hypothesis:
H_{01}: There is no significant relationship between material capability and competitive advantage in sugar companies in Western Kenya. The X^2 critical values= 3.84< X^2 test statistics =7.630 (df =1), the test statistic therefore falls in the rejection region and We conclude that there is a significant relationship between material capability and competitive advantage in sugar companies in Western Kenya. So we reject the null hypothesis and accept the outcome.

Conclusions

The mean of means of 3.5 for material capability indicate that the sugar firms have not done enough towards material capability. The companies under study have material capability limitations resulting in a vicious circle of sugarcane glut and scarcity.

Recommendations
Based on the findings, the industry should put high priority on sugarcane development, effective harvesting and supply management for sustainable material capability for the mills.

Areas for further study

The study recommends further research on: The influence of material capability on competitive advantage of the private owned sugar companies in Kenya.

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