Effects of Decomposability Costs Organizational Growth of Edible Oil Manufacturers in Kenya

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Abstract

This paper's discussion concentrated on the fact that the concept "growth" is used both for "change in amount" and for the process that leads to that change in edible oil manufacturers in Kenya. Today, estimation of production of edible oil is at 380,000 tones. This quantity constitutes about one-third of its annual demand, the rest is imported meaning that there is potential market for local firms in this industry -Export Processing Zone (EPZ, 2005). This implies that edible oil industry market in Kenya has not been exhausted. It is therefore evident that firms in this industry have the potential to grow as they exhaust the market. Firms in Edible oil industry have varied growth levels and yet there is market for their products. Firms can expand along different dimensions and show growth patterns overtime such as joint ventures, alliances, licensing, internationalization, diversification, integration but the general objectives of this study was to determine the level of organization decomposability in relation to coordination costs and how they affect firm growth. The argument here is to contribute to the knowledge about the relative and combined effects of coordination costs on firm growth in edible oil manufacturers in Kenya, and to limit the study to a more homogenous empirical context and generalize only to that context. This gives the study a closed-up nature that has a rich image especially when assessing organizational coordination costs along several dimensions of growth. The paper therefore sought to find out whether coordination costs could be a contributory factor in the varied growths levels of these firms. The research used a survey design with both quantitative and qualitative research approaches. The study was based on purposive sampling for manufacturing firms and stratified sampling for the respondents. Primary data was collected by use of questionnaires and yielded dichotomous answers by use of a Linkert Scale where 5=almost always, 4-often, 3-occasionally, 2-rarely, 1-never. 1-2 represented (0=No) while 3-5 represented (1=Yes). Secondary data was collected from the firm's annual financial statements, i.e. debt ratio, return on investment, profit retention ratio, liquidity ratio formed the measurement for growth.

This measurements were selected because they backtrack the proceedings of sales as the increase in sales necessitates increase in profits, return on investment, reduce debt ratio, on the basis of sales being a universal determinant of growth. The research analysis was based on correlation analysis model (path analysis) that calculates path coefficients, simple correlations, indirect effects, and total correlations for a set of data that clearly illustrated the relationship between coordination costs and firm growth. To make the data linear, the researcher used logarithmic transformation method to change the raw data into logarithmic mode to allow further arithmetic calculations to be done. The study found that the departments were highly interdependent of each other, tasks were shared and there were a lot of interrelations among the departments.

The study found that the decomposability costs in the oil manufacturing were relatively low. The decomposability costs were insignificant in influencing the growth of the oil manufacturing companies due to high departmental interdependencies. Organizations can realize the potential synergies by actively managing the interdependencies caused by sharing of resources which may add to coordination demand from organizations existing tasks and may cause marginal costs to outweigh marginal synergy benefits. The impact of the activity system on the partitioning and recombination of organization units inside the firm (decomposability) can affect the firm growth either negatively or positively in terms of costs associated with carrying out the tasks in a recombined form of organization units. Depending on the costs of transaction, an organization can choose a more modular or integrated form of carrying out tasks. But it has to be put in mind that decomposability of the activity system constraints a given level of complexity which is the degree of organization modularity. Given that, it is worthwhile to mention that the organization structure employed plays the important role of coordination.

Keywords: Synergy, Interdependencies, Marginal costs, Decomposability costs, Modularity, Organizational Structure

1. Introduction

Why do organizations in the same industry vary in their level of growth? This paper examines the question with respect to decomposability costs. It views organizations as a complex system of interdependent activities and tries to find out the role of decomposability costs in setting limits to organization growth. It has been observed that when there are significant transaction costs in the market, organizations experience limits to growth. Complexity and decomposability of an activity system affect the tradeoff between specialization and coordination, and consequently the firms choice of a more modular vs. a more integrated organization structure, to coordinate interdependencies between organization units, the level of hierarchy the organization adopts is very important.

The choice between integrated and modular organization structure is very essential and are a concern to most organization theorists. Specialization and adaptation is facilitated by modularity while integration promotes coordination and ensures a match among interdependent tasks. The underlying inherent interrelations among the tasks to be managed makes it difficult to choose between the two structures. If the interrelations of the task system are such that the systems are fully decomposable, that they can be divided into subsystems, then the modular structure can be preferred as it will distribute the burden among organizations units and strengthen the overall coordination capacity of the organization. A hierarchical organization structure will enhance the modular task system because in essence, it is a non-modular form to coordinate interactions between modules. The non-modular structure with the CEO at the top, managers and the rest going downwards enhance delegation of decisions rights and information processing responsibilities within the structure. Decomposability being particular distribution pattern of interdependencies will generate more coordination benefits since it helps coordinators to take into consideration responsibilities into cognitive capacity of individual units. When the task are intensely complex, or if they are not decomposable, organizational modularization is not optimal thus hierarchical structure with coordinating units that manage the interrelationship's between modules is needed. We will see the analysis that will show task decomposability impact organization growth.

1.1 Decomposability Costs

The distribution pattern of system interdependencies and that the less they are, the more decomposability costs will be experienced (Villalonga, 2004). This will affect firm growth in that high costs will reduce the retained profit ratio which is used for re-investment thus affecting firm growth. The measure for this variable took the number of distributed tasks into coupled tasks (modules) through decomposing tasks. The number of units that are parallel to the organization system were also considered.

Information processing cost can be lowered by decentralization or specialization. This allows for parallel information processing (both independent aggregation and computation). Specialization causes delays in decision making thus being a cost to the organization, especially when the information needs to be shared for decision making (Koh, 2005)). Decentralization can reduce the communication cost delay in decision making although the effectiveness of decentralized decision making may be limited.

The interdependent level of decision variables in a decentralized environment implies that decisions will be based on information available in a particular unit/branch. This is partial information and may not be wholly optimal especially in branches that are in different environments (Berend and Sapir, 2007).

There are certain complex problems that no one decision maker or teams of decision makers have the capacity to find a solution. This makes coordination difficult due to interdependencies. The concept is explicitly explained in the concept of NP-or NK models developed in computer Science (Evans *et al*., 2002). The coordination difficulty can also be traced to evolutionary biology (Futuyama, 2008), which was again introduced literature of management (Evans *et al*., 2002). NK models are used to show the complexity managers face when making decisions, including the imitation of, search for and adaptation to some practical solutions.

In these models, N is the level of decisions to be made (number), like the many dimensions that managers for practical strategic choices. K is the number of interdependent decisions. As an organization grows, both N and K increase. When an organization raises its production, it may need to purchase raw materials from many more suppliers, to meet the need for more customers. The interrelationship among the N decisions will reduce the feasibility that managers must divide among themselves the problems and each one of them to search for an optimal solution along a certain dimension. Together they will find a wholesome optimal solution for the entire problem set. When N decisions are interdependent, i.e. K>0, the search for solutions became more complicated, (Dryzek and List, 2003).

Interdependencies for firms have challenges that have been studied by scholars at many different levels. They complicate the innovation and product design process at the project level (Ethiraj & Levinthal, 2004), they prevent the evolutionary direction firms take to search or understand best practices (Evans *et al*., 2002); (Rivkin, 2000), thus subjecting organizations to more decision mistakes (Siggelkow, 2002). The challenges also reduce the essence/value of operational practices. They have to be implemented with their complementary parts. A good example is innovative human resource practices (e.g., teams, high-power incentive pay, employment security, training and flexible job assignments) achieve higher levels of productivity (Hamilton *et al*., 2003). Interdependencies at industry level lead to structures with persistent commonality performance across units/branches (Lenox, Rockart, & Lewin, 2006).

These studies on challenges of interdependencies broaden the idea of transaction costs to encompass transaction hazards among opportunistic agents (Cover and Permuter, 2007), obvious costs of defining, describing, adjusting, measuring, searching and compensating for the movement of material, information, and energy among agents with same interests (Schilling & Steensma, 2001). Transaction hazards make it difficult in making joint effort, and the obvious transaction costs, exacerbated by interdependencies, make joint decisions challenging.

2. Organizational Integration and Task Complexity

An integrated structure's major benefit is that coordination is promoted and ensures stability and fit among interdependent tasks. This is a joint decision making, which requires that information sharing and communication is considered among individual decision makers about factors that affect each other thus attaining multiple equilibriums. Such communication is usually rich and intense which requires face to face discussion and direct observation. To attain efficiency in coordination, integration need to be at the forefront since if provides a more homogenous communication system. Puranam (2001), posits that coordination advantages applies to the external and internal boundaries of the firm, and units within the firm. Homogenous communication system can be enjoyed by employees of the same unit than employees from the other units. Tasks that are more interdependent can be integrated in the same unit than to be separated into two units. The disadvantage with an integrated structure is that it places a manor amount of coordination workload on a few integrated units. Complexity increases the demand for information processing. Issues with many interdependent tasks is that they are difficult to solve due to the proliferation of the interaction terms as the number of decision variables may be more than the cognitive capacity of any unit thus necessitating coordination responsibility to be divided into multiple units.

Because of increased workload in complex communication and information processing, the probability of decision errors may be increased. Decision errors may occur when choices exceeds "the resolution power of available mathematical, statistical or logical algortithms, in terms of the number of variables that must be accommodated, or in the degree of stochasticity of relationships".

Therefore, at low level of complexity, which could be termed as near decomposability, integrated structure will realize more coordination benefits. When complexity is high, due to limits in individual units' coordination capacity, coordination responsibilities may be divided among many units despite the potential interdependencies among them.

3. Organizational Modularity and Task Decomposability

The distribution pattern of the underlying inherent interdependencies between activities is conditioned on the degree of interdependencies i.e, complexity of the activities system and the extend to which an organization can set up a modular structure, (Balwin & Clark, 2000; Rivkin & Sigglekow, 2007). A modular structure reduces the coordination intricacies of individual units. This structure enables a unit to concentrate on coordinating the interdependencies among tasks within the units (Baldwin, 2008). If the tasks are decomposed into modules reduces coordination costs thus having a positive impact on organizational growth. It can therefore be asserted that all factors held constant, the degree of organization modularity increases with the decomposability of interdependencies among the organization's activities.

3.1 Organization Hierarchy

When decision variables are highly interconnected, a fragmented structure will prohibit broad-scope information processing, (Rivkin & Siggelkow, 2003). This may cause decision errors. For example, a more divisionalised structure may prohibit Research and Development strategy that could have an effect on firm growth. It is therefore important to recombine the activities divided across organization units and ensure a match at the firm level. A hierarchical structure enhances hierarchical coordination because it is a non-modular form to coordinate interactions between the modules, (Langloise, 2002). A hierarchy possesses coordination benefits in comparison to other structures. It accumulates benefits in communication, information processing, and quality of decision making because decision are made in accordance with cognitive capacity. It changes a horizontal organization web of inter-unit interconnections into vertical communication web channels which economize on communication, (Langloise, 2002). It also enhances organization capacity for information processing. A structure that is decomposed i.e. where units compute independently and in parallel reduces the workload for each unit which in turn reduces decomposability costs and more information is available for the firm as a whole. For example, it saves the CEO to deal with normal unit decisions that benefit the whole firm as they would have been dealt by the unit managers, (Harris &Raviv, 2002).

Hierarchical structure reduces the probability of decision making errors which would have been otherwise costly. Accurate decision making relies on accurate and complete information. When interactions between decision variables are not decomposable, specialization in information processing will result in loss of information about important interactions between variables across units. Decisions based on incomplete information about the interactions are bound to be less beneficial to the organization which result in to coordination costs, (Marengo &Dosi, 2005). Therefore, hierarchical structure helps in comprehensive decision making by join cost saving in capturing of opportunities in intermediate units that lower managers would have missed. It can therefore be concluded that the level of inter-unit interdependencies is a function of the degree of activities portioning or specialization, (Puranam, 2001). Organization decomposability partitions the tasks and causes shifts in focus, knowledge generation, objectives, and incentives and makes them more heterogeneous among units which reduces on decomposability costs. The above therefore suggests that a hierarchical structure is essential when organization modularization at the lower level is not optimal due to limits in cognitive capacity. The firms have to partition their organization structure relative to the base task system in regard to cognitive capacity so that interdependencies are not left between the units at the base level that need to be dealt with by higher-level coordinators. Over partitioning is likely to happen when the task systems are very complex, or when they are less decomposed.

3.2 Interdependencies in Task Systems

Lenox *et al*,. (2008) posits that a firm undertakes numerous tasks that are interdependent at different levels such as business and corporate strategies, production technologies and managerial practices, product design among others. These numerous tasks can be measured by use of NK model of system interdependencies, (Rivkin, 2000) which can be applied to complex tasks that are in organizations. Two tasks are interdependence if they if they supply input to one another and which have inherent relationship between tasks that are dictated by the nature of their operations as opposed to being a choice by the firm.

Interdependencies among all activities are equal at the economy level although firms have a choice of whether to concentrate on interrelationships that have the potential for interdependencies among activities at the economy level. Two activities in a firm that can supply input to one another then one can conclude that the requirements of these two activities are specialized to each other, and that the two activities are interdependent and therefore to reduce on coordination costs, decomposability has to come into play.

4. Model Specification: Path Analysis

Path analysis' aim is to provide estimates of the magnitude and significance of hypothesized causal connections between sets of variables.

Path analysis indicates that variables are merely correlated; no causal relations are assumed. The independent (X) variables are called exogenous variables. The dependent (Y) variables are called endogenous variables. A *path coefficient* indicates the direct effect of a variable assumed to be a cause on another variable assumed to be an effect (Cyprien and Kumar, 2011).

Path analysis can be represented in two ways: as an equation or in diagrammatic form. For the purpose of this study, an equation will be used referred to as a structured equation, which is typically stated in its standardized form as follows: Growth =f (Decomposability Costs) $Z=f(P_{41}\ Z_1$

4.1 Data Transformation

To make the data linear, the researcher used logarithmic transformation method to change the raw data into logarithmic mode to allow further arithmetic calculations to be done. After the data was transformed into logarithmic mode, it was subjected to correlations analysis and multiple regressions.

4.2 Hypothesis

H_o– Decomposability costs do not affect organizational growth

Hypothesis testing

H_o– Decomposability costs do not affect organizational growth

Chi-Square Test between Growth and Decomposability Cost

	Value	df	Asymp. Sig.(2-sided)
Pearson Chi-Square	50.000[a]	45	.281
Likelihood Ratio	34.961	45	.859
Linear-by-Linear Association	1.734	1	.188

The researcher performed a chi-square test to assess whether growth and decomposability costs were dependent. The chi-square p=value was 0.281 (p>0.05). This shows that there was no significant statistical relationship between decomposability costs and the growth of the oil manufacturing companies. Therefore, we fail to reject the null hypothesis.

Decomposability Costs

The researcher collected data on the decomposability costs associated with the oil manufacturing companies. The data was analysed on a likert scale and computed into a range between 0 and 1. Mean values below 0.5 represented "No" and mean values from 0.5 to 1 represents "yes". The findings are shown in table 4.1.

	Mean	Std. Dev
Related tasks are performed in one department even if tasks are of different departments	.32	.477
Organization undertake contractual work in different tasks	.55	.510
Tasks are done by specialized teams	.59	.503
Departments independent in performing their tasks	.59	.503
Activity decisions come from the top management	.64	.492
Departments consult each other in performance of tasks	.68	.477
Individuals from different departments consult each other for advice in performing tasks	.73	.456
Departments share tasks most of the time	.77	.429
The organization have small departments	.77	.429
The government structure top bottom delegation	.77	.429

The information contained in table above shows findings on the decomposability costs associated with manufacturing of oil. According to the findings, most of the Oil manufacturing companies undertake contractual work in different tasks (M=0.55), employ specialized teams to do their tasks (M=0.59) and their departments are independent in performing their tasks (M=0.59).

Also in most of the oil manufacturing companies, activity decisions come from the top management (M=0.64), departments consult each other (M=0.68) and individuals from different departments consult each other for advice in performing tasks (M=0.73). In most of oil manufacturing companies tasks are shared (M=0.77), organizations have small departments (M=0.77) and have adopted a government like structure with top bottom delegation of responsibilities (M=0.77).

5. Discussions, Conclusions and Recommendations

5.1 Introduction

The study was motivated by the need to establish the relationship between coordination costs and the growth of the oil manufacturing companies. The study focused on Decomposability costs.

5.2 Discussion of the Findings

The researcher collected data from three oil manufacturing companies in Kenya. The respondents were middle and senior level managers. The male respondents accounted for 59% of the total respondents. Majority of the managers (72.8%) were aged below 41 years implying that oil manufacturing companies has got young and youthful persons in managerial positions. Most of the respondents had a work experience of between 3-4 years.
The study collected information on the coordination costs focusing on decomposability costs and how they relate with the growth of the oil manufacturing companies. This was done to create an opener to the management of the companies on how to put effective measures to enable them perform well. Although according to (Cooper and Wolfe, 2005), the intervention selected by the management is based on scheduling, performance measurement, incentive contracts, job assignment, and asset ownership.

5.3 Decomposability Costs Effect on Organizational Growth

The study conducted various arithmetic tests to evaluate the decomposability costs incurred in companies and also how it relates with the organizational growth of the oil manufacturing companies. From the findings, the decomposability costs of the oil manufacturing companies include subcontracting other firms to do their tasks and independence of their departments.

However, the decomposing costs in most of the oil manufacturing companies were low since departments consulted each other and even individuals from different departments used to consult each other when performing the company's tasks. Also the study found that in most of the companies the tasks are shared, organizations have small departments and have adopted a government like structure with top bottom delegation. This high dependence eliminates the extra costs incurred when separating duties. Cover and Permuter (2007) argued that in an organization structure multiple interdependent tasks can be grouped into divisions neutralizing the conflicting objectives within the divisions.

The study found that decomposability cost is inversely related with growth of the oil manufacturing companies. This indicates that when the costs were high, the growth of the oil manufacturing companies declined and vice versa. Decomposability costs also increase with increase in inter-unit and span of control costs but decrease with increase in complexity costs. This agrees with Gulanic and Eisenhardt (2001) argument that that the level of complexity determines the extent of decomposability. The more decomposed the activity system the more modular the organization structure.

The regression results shows that decomposability costs is insignificant in influencing the growth of the oil manufacturing companies since the t statistics was found to be very insignificant at 0.896. Therefore the influence of the decomposability costs on the profits is negligible. This came as a result of most departments in the organization under study shared and consulted each other most of the time. This is further shown by the hypothesis testing results which produced chi square value of $p>0.05$ showing no statistical significance between growth and decomposability costs. Therefore the decomposability costs influence the growth of oil making companies to low extent.

6. Conclusion

The study concludes that in most of the oil manufacturing companies, the decomposability costs were very minimal and low. This is because in most of the companies departments work as a team and consult each other. The tasks are shared and the departments are small in numbers. The companies have also top bottom structure and high level of delegation of duties.

The study notes that decomposability costs are negatively related with the profits (growth) of the oil making companies. Decomposability costs increase with increase in inter-unit costs and span of control costs and decrease when complexity costs increases in the oil manufacturing companies.

The decomposability costs negligibly affect the profits of the oil manufacturing companies. Although they are thought to negatively affect the growth of the companies. The amount of effect on the growth is so negligible and insignificant.

6.2 Suggestions for Further Studies

The study collected information on the growth and coordination costs in the three oil manufacturing companies for the period between 2003 and 2012. However, the findings could be different in other companies. It is recommended that a similar study be done in other companies to compare the results and get more knowledge on the coordinating costs and growth of the companies.

The study collected information on coordinating costs. However, there is little known about the effects of other costs on the growth of the oil manufacturing costs. It is recommended that other studies be done on other types of costs incurred by the companies in the course of their operations to know more on how they affect the growth of the companies.

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