

## FACTORS AFFECTING THE SIZE OF ANIMAL FEED MANUFACTURING FIRMS IN NYERI AND KIAMBU COUNTIES

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### ABSTRACT

**T**he purpose of this study was to investigate the factors affecting the size of animal feed manufacturing firms in Nyeri and Kiambu Counties. The study aimed at exploring the role of work personality characteristics, technology adapted, level of education and organizational culture on the size of animal feed manufacturing firms. The research employed a descriptive survey design and targeted 21 animal feed milling firms with a sample of 105 participants. Data was collected using a self-administered questionnaire and analyzed using descriptive and inferential statistical methods. Regression analysis revealed that age, motivation, education and mission and vision were statistically significant at 95% confidence interval. 54.9% of the variation was accounted for/explained by the variables in the model. Findings from the regression analysis indicated that having a mission and vision was the strongest determinant of firm size with a unit increase in mission and vision bringing on average 2.893 times increase in firm size if other variables are kept constant. The researcher concluded that the feed manufacturing firms which had an organizational culture and employed highly educated personnel were more likely to enjoy growth of their firms. The researcher recommended that all the firms should strive to adopt a vision and mission and that the firms should embrace training the employees or offering induction training to their employees for the firm to grow but further studies may be commissioned to confirm or disapprove our findings.

**Key Words:** Organization culture; Technology; Research and Development; Size

## 1.0 INTRODUCTION

Livestock farming is the rearing of cattle, sheep, goats, horses, and poultry. Two types of livestock farming may be distinguished, namely traditional or pastoral and commercial. According to the 2009 Kenya population and housing census, the country has 3,355,407 heads of exotic cattle and 14, 112, 367 heads of indigenous cattle. The sheep population is 17, 129,606 while goats are estimated to have a population of 27,740,153. There are 2,971 111 camels in the country (Kenya National Bureau of Statistics, 2009). According to RoK (2008) the livestock sub-sector accounts for about 10% of the entire GDP and about 42% of the agricultural GDP. It also supplies the domestic requirements of meat, milk and dairy products, and other livestock products while accounting for about 30% of the total marketed agricultural products. The sub-sector earns the country substantial foreign exchange through export of live animals, hides and skins, dairy products, and some processed pork products. It also employs about 50 percent of the country's agricultural sector labor-force. The sub-sector also contributes substantial earnings to households through sale of livestock and livestock products; and provides raw material for agro industries.

Livestock farming is a major component of many rural households at least in the High and Medium Potential Lands in Kenya. As such animal feeds industry is an important subsector in the economy to supplement livestock farming (Abate, 2009). Association of Kenya Feed Manufacturers (AKEFEMA) (2009) state that there are over 80 commercial feed manufacturers in Kenya who produce a variety of specialized products ranging from dairy meal, calf meal, chick mash, growers mash, broiler starter, broiler finisher among others. The association notes that the animal feed industry utilizes mostly maize, wheat, barley, oats, millet and their by-products as energy source, which are blended with oil cakes, animal products and by-products such as fishmeal as crude protein source. Energy and crude protein accounts for 55% of content in animal feeds. Maize accounts for 36% of poultry feed costs and 31% of the costs for both poultry and pigs. Ingredients used in feeds formulation such as amino acids, macro and micro mineral nutrients, vitamins and essential additives are imported. However quality mixes continues to be a challenge.

The main livestock feeds consist of roughages, concentrates, minerals and vitamins. The greatest proportion of diet for ruminants is roughages that include grass and browse. However, in low rainfall areas, where extensive livestock keeping is practiced, there is minimal supplementation with concentrates and minerals. In high rainfall areas, concentrates make a significant proportion of livestock diet (RoK, 2011). In these latter areas, the cost of producing roughage sources is high compared to low rainfall areas where no inputs are used in production of roughages. Grazing animals (cattle, sheep, goats, camels and donkeys) are basically fed on natural pastures or fodder with supplemental concentrates for high yielding animals. The animals in the High and Medium Potential Lands are fed on improved pastures and fodder, while in arid and semi-arid areas, they are fed on natural pastures (AKEFEMA, 2009).

Domestic supply of animal feed has been volatile due to its dependence on the seasonality of supply of inputs. The basic factors affecting the supply of quality feed are its price, availability, the quality of raw material used, processing methods, handling and storage of mixed feeds, among other factor. Most of the fine ingredients including vitamins, minerals, amino acids and other feed additives, are imported. The Kenya Bureau of Standards (KEBS) has set standards on feeds for most livestock species RoK (2011). However, the standardization of feeds for some other categories of animals is not complete. In addition, feed ingredients themselves are not fully standardized. As a result, feed manufacturers face great difficulties in meeting acceptable standards of feeds using such feed ingredients.

According to Muriuki (2011), the high costs of raw materials and the volatility of cost due to local and international market dynamics as well as political pressure on the cereal industry has created a lot of variability in the feed milling industry. These costs have been steadily increasing in the past. The last four years since 2008 has seen the highest increase, with 2010 alone seeing a 60-90% increase. He further indicates that the prices of most dairy cattle feeds went up dramatically, in some cases by more than 100 percent in 2008. As a result, many milling industries in Kenya today are operating at a small scale and below their installed capacities while others have exited.

This line of thought is also supported by Maina (2010) who observes that there are some urgent issues in the livestock industry that need immediate attention to ensure continued viability and sustained firm growth. He asserts that given the increase in the hybrid poultry and dairy cattle populations in the recent past, our actual feeds production levels should be commensurate with these increases. However this is not the case. The dilemma is: is there a demand-supply imbalance within the feed milling industry forcing some of the millers to close? Or is the closure of the dairy feed millers pegged on firm size?

Söderbom, Teal & Wambugu (2005), postulate that companies have varying degrees of size, production capacity and organizational complexity, influenced by factors such as layers of management, number of employees, divisional structure, subsidiary relationships, and the number and location of their operations. The size of a firm dictates its structuring which includes the type of departmentalization the company should work in. This is the basis by which jobs will be grouped together, and every organization can have its own way of doing so, depending on the business operations and company objectives. The structure of an organization should be broken up into departments, based on the function that the group of employees carries out. For example, a company may have a technical department, a manufacturing department and a finance department, among others. Each department is aware of its own obligations, and can interact with other departments to share information and assistance. Departmentalization subdivides work and workers into separate units responsible for the completion of specific tasks.

Industrialized economies have recently entered a period of substantial organizational change. Piore and Sabel (2004) likened this transition to a "second industrial divide". On the other hand, Drucker (2008) saw it as the "coming of the new organization" Among the postulated aspects of the transition are decreases in firm size, a shift to externally provided services, and a shift from mass production to more flexible arrangements. The growing attention to these organizational changes has coincided with a rapid drop in the price of computing power, significant increases in technology usage, and one infers, decreases in the costs of information processing in general.

Yang and Chen (2009) compared the technical efficiency of SMEs with that of large firms and were inconclusive about the relationship when choosing different estimation methods. In a study on Portuguese companies Serrasqueiro and Nunes (2008) found that size is related positively to performance but only for the sample of SMEs and not for large firms. A similar finding by Diaz and Sanchez (2008) in the Spanish context suggested that SMEs were more efficient than large firms lending support to earlier studies that identified an inverse relationship between size and performance. These studies imply a relationship between firm size and performance that might not necessarily be linear, as illustrated in Barrett, Christopher, Marc, Bellemare, Janet and Hou (2010) and Yoon (2004) which conclude that company growth beyond optimal level can deteriorate performance.

Large firms benefit in terms of economies of scale, ease to obtain capital, ability to spread their risks by producing in lots of markets, producing a range of different products and enhanced competitiveness

especially in the food and service sector. Majority of the animal feed manufacturing firms are small in terms of number of employees and market share. This places the companies at a disadvantage when competing with multinationals operating in Kenya which in turn limits their profitability. An interesting aspect of economic growth is that much of it takes place through the growth in the size of existing organizations. The lack of growth in these companies also limits benefits to the consumer which come from a highly competitive industry. Empirical evidence on the determinants of the size of animal feed manufacturing firms is scarce. A study into the factors affecting the size of such firms was not only necessary but inevitable. It is useful to study the determinants of firm size in order to understand the constraints to size and growth. This study explored the role of work personality characteristics, technology adapted, level of education and organizational culture on the size of animal feed manufacturing firms.

## **2.0 LITERATURE REVIEW**

### **2.1 *Empirical review***

Under this section, findings from related studies are presented. The findings are discussed and criticized. The purpose of the empirical review was to enable the researcher identify gaps regarding studies on firm size.

#### **2.1.1 Employee personal characteristics and firm size**

Gede & Lawanson (2011) investigated the relationship between employee characteristics and job performance in Bayelsa State Ministry of Education, Nigeria. The study found a significant relationship between experience and job performance of employees. This is probably due to the fact that the more experience the employee gathers as a result of long years of service, the higher the performance of the employee. This is more so because he/she has to put into practice all the experience he/she has acquired over the years. This is in support of the findings of Rugai and Agih (2008) who found a high relationship between teachers experience and their job performance. They explained that the longer a teacher works in a school, the greater probability that his productivity will be higher. Various research findings have shown that there is a significant relationship between employee characteristics and their performance.

McDaniel, Schmidt & Hunter (1988) summarized data on the relation between job experience and job performance from a total sample of 16,058. The correlation between job experience and job performance was found to be moderated by two variables: length of experience and job complexity. The highest correlations were obtained in populations with low mean levels of job experience and for jobs that place low levels of cognitive demands on employees. A study for America's Department of Labour showed job performance peaking at 35, and then declining. It varied by industry: the fall was slow in footwear, faster in furniture (Vegard, 2003).

Previous reviews of the literature on the relationship between age and job performance have largely focused on core task performance but have paid much less attention to other job behaviors that also contribute to productivity. Feldman (2008) provided an expanded meta-analysis on the relationship between age and job performance that includes 10 dimensions of job performance: core task performance, creativity, performance in training programs, organizational citizenship behaviors, safety performance, general counterproductive work behaviors, workplace aggression, on-the-job substance use, tardiness, and absenteeism. Results showed that although age was largely unrelated to core task performance, creativity, and performance in training programs, it demonstrated stronger relationships with the other 7 performance dimensions. Results also highlighted that the relationships of age with core task performance and with counterproductive work behaviors are curvilinear in nature and that several sample characteristics and data collection characteristics moderate age-performance relationships.

World at Work (2013) assessed gender differences on how stress impacts job performance. The study found that both genders reported that difficulty concentrating is the most common way personal problems and stress disrupt work performance, with nearly half of females (49.2%) and 44.3% of males citing this impact. Absenteeism is also a common result of stress. Although females reported slightly higher rates of absenteeism (17.1% vs 15.8%), males on average missed more days of work because of a personal problem during the previous three months

### **2.1.2 Technology and Firm Size**

Existing data confirms the almost self-evident increase in power and ubiquity of technology. Studies show that investment in computers has increased steadily and dramatically since at least 1971 (Grove, 2000). After taking into account quality improvements, there has been over a tenfold increase in technology investments between 1971 and 2000. Each of the major business sectors shows the same accelerating trend toward increased use of technology. A category of equipment that was largely insignificant two decades ago is now very important. Driving much of this investment are exponential declines in the price/performance of computers and related technology (Gurbaxani & Mendelson, 2000). Furthermore, "Moore's Law", which posits a doubling of transistor density every 18 months is projected to hold into the 2020s; the one to two million transistors per chip in 2000 may be 50-100 million by the year 2020 (Grove, 2000). Whatever effects of technology these numbers are of sufficient magnitude to augur even greater effects in the near future.

In order to understand the impact of technology on firm size, it is useful to understand the economic rationale underlying the determination of firm size in the first place. As Friedman (1955) notes:

"The appropriate size of firm to produce, say, copper, may be different for two different mines, and both can exist simultaneously because it is impossible to duplicate either one precisely. . . . The existing distribution (of firm sizes) reflects both 'mistakes' and intended differences designed to take advantage of the particular specialized resources under the control of different firms."

Ijiri and Simon (1977) provide more detailed models of the processes that give rise to a distribution of firms of different sizes in an industry. They note that the size distribution of firms in an industry is a result of the successes and failures of numerous individual firms over time. The success of each individual firm, in turn, is determined by a number of factors, including how well it takes advantage of its specialized resources and also how well it adapts to changing conditions in the industry as a whole.

This work is especially concerned with how firms adapt to one particular kind of change: the availability of increasingly powerful technology. The overall effects of this technology clearly depend on how individual firms use it and how this usage affects their subsequent performance. If each firm's use of technology leads to widely varying results, then there might be no overall patterns of change in the economy as a whole. On the other hand, if certain kinds of adaptation to technology are generally more successful than others, then one may be able to observe the resulting changes as overall trends in the economy. For instance, if the widespread use of technology increases the viability of smaller firms relative to larger ones, then this might be part of the reason for the decrease in average firm size that was noted above.

### **2.1.3 Level of Education and Firm Size**

An extensive body of literature has been devoted to testing the human capital conception of education as opposed to its potential screening function as a vehicle for conveying information on individuals' abilities (Weiss, 2005). The ability of education to act as a signal of individual productive capacities was first noted

by Arrow (1973), and Stiglitz (1975). One of the ways of disentangling these two components of education is to assume, first, that pre-schooling abilities, and therefore the signaling effect of education, are particularly crucial at first entry into the labour market. Indeed, this is the time when firms have least information on the expected productivity of applicants. Once applicants have been recruited and have acquired some experience, on-the-job screening and incentive devices such as economic contests provide additional information on their performance. The informational role of education should consequently decline with experience, an assumption consistent with recent findings (Jaeger and Page, 2006; Belman and Heywood, 2007; Altonji and Pierret, 2007). Focusing on the allocative use of (educational) credentials by employers thus allows us to appraise the signaling impact of education. It is assumed that the first assignment after recruitment is determined mainly by the signalling effect of education, whereas the productivity-enhancing effect translates directly into wages.

Finally, high starting wages are said to reflect a two fold pricing process, one based on the notion that education makes workers more productive, the other on the notion that a good level of education signals certain traits and abilities, or according to Thurow's (1975) approach a particular capacity to absorb new skills on the job, and that this makes it worthwhile for employers to match candidates to different types of jobs. Of course, such a situation arises because of the heterogeneity of jobs on the demand side of the market. Furthermore, it is argued that employers do not attach the same importance to education as a screening device. In order to underline the variety of employers' expectations regarding the role of education, the researcher has chosen to focus on the firm size criterion.

Regarding the information problems firms may encounter, it can be stated that the larger the firm, the harder it becomes to monitor workers' performance (Williams, Burns & Harmon, 1967). Large firms differ also from smaller ones in that they offer a wider variety of jobs. In addition, large firms are often characterized by more complex production technology, higher expenditure on R&D and a faster pace of technical and organizational change, all of which requires larger firms to make specific efforts to extend and update their workers' skills and capabilities. Finally, as large employers tend to be the most capital intensive, at least in manufacturing, the cost of a bad job-worker match could be much more costly than in a small company. Large firms are therefore bound to have a greater need for information than small ones in staff recruitment matters. They are therefore likely to pay greater attention to educational credentials and to offer a higher bonus for this information. As a result, they are likely to value educational qualifications for both their signalling contribution and their productivity-enhancing aspect, whereas other firms, for which information on applicants' ability is less crucial, would give priority to the latter aspect in the remuneration of education. The signaling function of education would then cause job applicants to be allocated in ways likely to affect future rewards and benefits along the career path.

Several analytical arguments support the idea that larger firms will be more precise than smaller ones about examining their applicants' educational credentials and also more likely to adopt more specific selection criteria. In small companies, work is often less specialized, since the jobs involve several tasks and each worker is able to build up a fairly clear general picture of the firm's overall production process. At the same time, however, the average share of labour costs per unit produced (value added) is higher than in larger firms, at least in the manufacturing sector (Arnaud, 2001). This probably leads management in smaller firms to monitor worker effort more closely. Such supervision is facilitated by the relatively small size of the workplace and by the high level of interaction between the tasks of individual workers. Research shows that in Kenyan manufacturing industry, the organization of work in SMEs is characterized by direct supervision, with line managers specifying the nature of the work in detail.

### **2.1.4 Organizational Culture and firm size**

According to Schein's theory (1992), organizational culture is defined as:

A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as a correct way to perceive, think and feel in relation to those problems.

Schein (1992), observes that corporate culture is the collection of attitudes, experiences and values that guide the way employees behave. It is a set of broad, tacitly understood rules which tell employees what to do under a wide variety of unimaginable circumstances. Corporate culture, which is acknowledged as a company's identity, has started to gain more importance with the developments in recent years. The main reason for a company forming a genuine culture is the effectiveness of the culture on business life, employees and customer relations. It helps the firm to be well-known, and form its values and relations with other organizations and individuals. Nowadays, the possibility of feed manufacturers being able to compete both in national and international markets and being able to meet clients', time, cost and quality, expectations is high.

An efficient feeds industry should have clear, defined and readily available policies that dictate a whole range of items, such as dress code, acceptable internet usage, working hours and other issues. Without these rules, you run the risk of confusion amongst employees, which can lead to lower productivity thus poor operational efficiency (Wakeling, 2010). All these collectively impact on a company's size.

## **2.2 Theoretical Review**

A theory is a well-established principle that has been developed to explain some aspect of the natural world. A theory arises from repeated observation and testing and incorporates facts, laws, predictions, and tested hypotheses that are widely accepted. The study was guided by the neoclassical and growth of the firm theories. The purpose of the theoretical review was to demonstrate the researcher's familiarity with present intellectual currents and concerns.

### **2.2.1 Neoclassical theory of the firm**

In a nutshell, the neoclassical theory of the firm has developed along two distinct lines. The static theory develops the implications of profit maximization for the determination of factor demands, output, and equilibrium firm size. The dynamic theory uses intertemporal optimization to analyze the investment cum growth decisions of the firm (Hart, 1995). In neoclassical theory, the firm is a 'black box' there to explain how changes in inputs lead to changes in outputs. The firm is a conceptualization that represents, formally, the actions of the owners of inputs who place their inputs in the highest value uses, and makes sure that production is separated from consumption. The firm produces only for outsiders, there is no on the job or internal consumption, no self-sufficiency. In fact there are no managers or employees to indulge in on the job consumption and as production are separated from consumption, no self-sufficiency. This requirement defines the firm (for neoclassical theory), but it has little to do with the management of some by others. The firm in neoclassical theory is no more or less than a specialized unit of production, but it can be a one-person unit (Demsetz, 1995).

The neoclassical theory of the firm is relevant to the study because it considers the size of the firm as an important element of success for the company. The theory recognizes that there exist determinants to the firm size which if taken care of by the entrepreneur can promote size and ultimately growth. The neoclassical theory is alive to the fact that bigger firms benefit from economies of scale an advantage that small companies don't have.

## **2.2.2 Theory of growth of the firm**

Since this the study is dealing with the size and growth of small businesses the researcher saw it best to adapt the theory of the growth of the firm. This theory looks into how small businesses are started and the factors that determine their growth or lack thereof. There are two proponents of this theory Edith Penrose and Storey.

Penrose focused on the “insides” of such organizations, to explain endogenous knowledge –creation, innovation and firm growth, saw the external environment, as an ‘image’ in the minds of management, and posited a dynamic interaction between the internal and external environments, which defined what she called firms ‘productive opportunity’ (Penrose, 1959). She attributed importance to human resources in particular management and saw managerial constraints as limiting the rate of growth of firms, albeit not its size per se.

The focus on firms as real life organizations, on human resources, on intra-firm learning, on endogenous knowledge, innovation and growth, and the interaction of exogenous and endogenous to include psychological, factors in determining managerial motivations and firms’ growth, puts Penrose in a unique category. It was the first organizational theory on the firm that goes well beyond (organizational) economics approaches, of the transaction costs type and provides a natural link to management and organization studies (Penrose, 1965). The theory as presented by Storey (1994) considers the growing small firm by a categorization combining three components namely; the starting resources of the entrepreneur(s), the firm and the strategy.

## **3.0 RESEARCH METHODOLOGY**

### **3.1 *Research Design***

This research employed a descriptive survey design where data was collected from members of the population in order to determine the factors affecting firm size. According to (Orodho, 2004), descriptive survey design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. This was because the researcher’s view was to get detailed information and description from the respondents regarding the animal feed milling industry

### **3.2 *Sampling Procedure***

Census of all the 21 feed millers was done. Sampling is a procedure through which some elements are selected from the population to be representatives of the whole group. Stratified random sampling was done so as to get one respondent from each major department. The departments were administration, finance/accounting, marketing, supervisory and stores totaling to 105 respondents (5 respondents from each of the 21 firms).

### **3.3 *Data Collection***

The main data collection tool was questionnaires. A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Usually, a questionnaire consists of a number of questions that the respondent has to answer in a set format. The researcher administered questionnaires personally, made sure responses were obtained, and ensured completeness, validity and reliability of the data. The questionnaires were pre-tested through a pilot test before actual data collection commenced.

### 3.4 Data Analysis and Presentation

Data was analyzed using descriptive and inferential statistical methods. Descriptive statistics included percentages and frequencies while inferential statistics included regression and Pearson’s chi-square which make us understand relationship between the variables.

#### 3.4.1 The Logistic Regression Model

The study adopted the following research model

$$Y_i = \beta_0 + \beta_1 AGE + \beta_2 MOT + \beta_3 EBP + \beta_4 EDU + \beta_5 COMPS + \beta_6 ETH + \beta_7 MV$$

Where

$Y_i$  = Firm Size (i=0 if employees < 30 & I = 1 if employees > 30)

$\beta_0$  = Constant

$\beta_0$  to  $\beta_7$  are coefficients that were estimated

The description, measurement and a priori expectation of the independent variables are summarized in Table 1.

The firms which had less than 30 employees were considered small while those which had more than 30 employees were considered big. On the other hand, employees who had attained the primary and or secondary education were considered unskilled while those who had tertiary, college and or university education were considered skilled.

**Table 1: Measurement variables used in firm size regression analysis**

Variable	Description	Measurement	A priori Expectation
AGE	Age of employee in years	Continuous, years	Positive
MOT (Motivation)	Binary variable indicating employee was motivated	0 = No 1 = Yes	Positive
EXP (Experience)	Experience of more than four years of work	0 = no 1= yes	Positive
EDU (Education)	Years of formal schooling	Years	Positive
COMPS (Computers)	Feed miller had computers	0 = no 1 = yes	Negative
Ethics (ETH)	Organization has a code of ethics	0 = no 1=yes	Positive
Mission and vision (MV)	Organization had a mission and vision	0 = no 1= yes	Positive

## 4.0 Empirical results and Discussion

### 4.1 Response Rate

This chapter presents data analysis, findings and discussions for all the three objectives in this study. Data was analyzed using descriptive and inferential statistical methods. Information processed was tabulated. The study carried out a census of the 21 animal feed milling industries. A purposive sampling was done to pick out 5 respondents from each factory across various departments.

**Table 2: Response Rate**

Category	Issued Questionnaires	Returned Questionnaires	Return rate
Administrators	21	21	100%
Accountants	21	20	95.23%
Supervisory	21	16	76.19%
Stores	21	17	80.9%
Marketing officer	21	16	76.19%
Total	105	90	85.70%

The return rate was 85.7% as shown in Table 2. It is evident that all the respondents did not comply. The questionnaires that were returned were 90. This translated to the return rate being 85.70%. It is indisputable that this was a good return rate ensuring adequate information for the study. This is according to the argument by Baruch (2009) who felt that return rate could be deemed good if it exceeds the 70% percent threshold.

### 4.2 Factors Affecting firm size of Animal Feed Milling Industry

This section presents findings related to the objectives of the study.

#### 4.2.1 Association between Technology Adopted and Firm Size

In order to meet the first objective of the study “to establish whether there was a significant association between the size of feed manufacturing firms in Nyeri and Kiambu Counties and the type of technology adopted”, a chi square was run. Employee number was taken as indicative of size of the firm. Following is a table showing the case processing summary for the association between different forms of technology adopted and firm size.

**Table 3: Cross Tabulations of Association between Employee number and PC computers**

		PC computers		Total	
		No	Yes		
Employee number	less than 30	Count	20.0	28.0	48.0
		Expected	21.3	26.7	48.0
	more than 30	Count	20.0	22.0	42.0
		Expected	18.7	23.3	42.0
		Count			
		Count			
Total	Count	40.0	50.0	90.0	

			PC computers		Total
			No	Yes	
Employee number	less than 30	Count	20.0	28.0	48.0
		Expected	21.3	26.7	48.0
		Count			
	more than 30	Count	20.0	22.0	42.0
		Expected	18.7	23.3	42.0
		Count			
Total	Count	40.0	50.0	90.0	
	Expected	40.0	50.0	90.0	
	Count				

**Table 4: Summarized Chi-square results for types of technology adopted and Firm Size**

Type of technology	Value	Degrees of freedom	Minimum expected count	Cells with expected count less than 5	Asymp. Sig (2 sided)
PC Computers	0.321 <sup>a</sup>	1	18.67	0%	0.571
Bar code readers	4.850 <sup>a</sup>	1	9.33	0%	0.028*
Website and e-marketing	15.015 <sup>a</sup>	1	19.13	0%	.000***
Automated inventory	4.850 <sup>a</sup>	1	9.33	0%	0.028*
Automated milling machines	.321 <sup>a</sup>	1	18.670	0%	.571
Communication equipment	1.540 <sup>a</sup>	1	20.07	0%	0.215

\*\*\*-significant at 1%

\*- significant at 5%

A Chi-square was performed to determine if a firm's size was significantly associated with technology adapted. The tests showed a significant relationship between Bar code readers ( $\chi^2_{(1)}=4.850$   $p=.028$ ), use of websites and e-marketing ( $\chi^2_{(1)}=15.015$   $p=.000$ ), automated inventory ( $\chi^2_{(1)}=4.850$   $p=.028$  at) at 1% level of significance and size of the firm. This is no evidence that technology influences firm size since only three attributes of technology proved statistically significant. The researcher therefore fails to reject the first null hypothesis and concludes that there is no significant association between the type of technology adopted and the size of feed manufacturing firms.

#### 4.2.2 Association between Education and Firm Size

In order to meet the second objective of the study "to establish whether there was a significant association between the size of the firm of feed manufacturing firms in Nyeri and Kiambu Counties and the level of education", a chi square was run. Employee number was taken as indicative of size of the firm. Small firms comprised 53.3% of the sampled firms as shown in Table 5.

**Table 5: Size of Firms and Employee Skills**

	Firm Size	Education level		Total	%
		unskilled	Skilled		
Employee number	less than 30	24.0	24.0	48.0	53.3
	more than 30	21.0	21.0	42.0	46.6
Total		45.0	45.0	90.0	100%

**Table 6: Chi-Square showing Association between Education and Firm Size**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.464 <sup>a</sup>	1	.000
N of Valid Cases	90		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.00.

b. Computed only for a 2x2 table

A chi-square was performed to determine if there was a significant association between a firm's size and educational level of employees. The test showed a significant relationship between the two where  $\chi^2_{(1)} = 14.464$   $p = .000$  at 95% confidence interval. These chi square results between size of the firm and the education level employees imply that utilization of skilled personnel increases the chances of growth of firms or big firms have adequate resources to engage skilled workforce. Based on these findings therefore, the researcher rejects the second null hypothesis and concludes that there is association between education and size of animal feed manufacturing firms.

### 4.3.3 Determinants of Size of Feed Manufacturing Firms

**Table 7: Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	52.778 <sup>a</sup>	.549	.733

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than .001.

The variables in the logistic model: work personality characteristics, (age, motivation, experience), technology (readers-bar code readers and computers), culture (ethics-code, mission and vision), together account for about 54.9 percent the explanation for firm size. This shows that the selected determinants account for a significant variation in firm size. With this evidence the researcher rejects the third null hypothesis and concludes that there is a relationship between determinants of size of animal feed manufacturing firms.

Generally speaking, the higher the pseudo R-squared statistic, the better the model fits the data. In this case, it would probably be said that the model "moderately" fits the data (in other words, although the model accounts for a significant amount of the variation in firm size, there are also lots of other variables not in the model which influence this firm size.

**Table 8: Regression co-efficients**

	$\beta$	S.E.	Wald	Sig.
AGE	-1.487	0.663	5.025	.025*
MOT	2.858	1.359	4.425	.035*
EXP	-2.072	1.524	1.848	0.174
EDU	1.729	2.247	1.475	0.024*
COMPS	1.022	2.063	0.961	0.327
Ethics	0.717	1.608	0.199	0.655
MV	2.893	1.01	8.207	.004*
Constant	-6.571	5.266	1.557	0.212

\*-significant at 5%

Regression analysis was used to deduce a model that could be used to explain the determinants of firm size of animal feeds. Table 8, shows the contribution of each variable in explaining the firm size as shown by standardized beta values which assess the contribution of each variable towards the prediction of the dependent variable. Organizational culture (OC) had the greatest effect on firm size with a unit change in mission and vision, holding all other variables constant, resulting to a 28.93% increase in firm size. Use of computers (COMPS) had the least effect on firm size with a unit change in use of computers holding all other variables constant, resulting to a 10.2% increase in firm size. The overall equation as suggested in the conceptual framework can be represented by use of beta values as follows:

$$\text{Firm Size } (Y_i) = -6.571 - 1.487 \text{ AGE} + 2.858 \text{ MOT} - 2.072 \text{ EXP} + 1.729 \text{ EDU} + 1.022 \text{ COMPS} + 0.717 \text{ ETH} + 2.893 \text{ MV}$$

The first variable, personal characteristic was indicated by age (AGE), motivation (MOT) and experience (EXP). Only motivation ( $P < 0.05$ ) among the three indicators was found to be statistically significant implying that motivation was an important aspect among the personal characteristics of the employees of animal feed manufacturers. The second variable of the study is education indicated by the highest academic level completed (EDU). The findings indicate that education is significant ( $P < 0.05$ ). This means that highly educated employees are crucial for growth firm size.

The third variable is technology indicated by use of computers (COMPS) which was found not to be significant implying that technology is not a strong predictor of firm size. The fourth variable was organization culture (OC) indicated by code of ethics and mission and vision. Mission and vision was found to be significant ( $P < 0.05$ ) in addition mission and vision explained the highest (28.93%) variation of firm size. This implies that organization culture is a strong predictor of firm size. This can be attributed to a well-tailored mission and vision aimed at improving job performance of employees leading to growth in firm size. According to Muriithi, Kihoro and Waititu (2012), the Wald statistic tests the unique contribution of each predictor in the context of the other predictors. Therefore, MV and AGE have the highest contribution (Wald statistic 8.207 and 5.025) in the model in that order.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Conclusion**

The study found that various forms of technology were adopted by the animal feed firms such as use of computers, websites and e-marketing and barcode readers. However there was no significant relationship established between technology and firm size. Similarly no significant relationship was found between personal characteristics and firm size. Majority of the employees were found to have post-secondary qualifications and a significant relationship was established between education and firm size. Organization culture was found to have a significant relationship with firm size and had the highest influence on firm size.

There was some evidence that adopting technology could work to increase the size of a feed milling firm. However, this was only relevant for some form of technology for example bar code readers, websites and e-marketing, use of automated inventory. The feed manufacturing firms which use persons with high academic achievements were more likely to enjoy growth of their firms. Corporate culture and more so motivation is important for the growth of firms in size this can be attributed to higher employee output increasing the company's growth. Personal characterizes account for a very small variation of firm size.

### **5.2 Recommendations**

In view of the study findings and conclusions, the following recommendations are made.

- (i) All the firms should strive to adopt the use of appropriate technology that is consistent with their production needs.
- (ii) The firms should embrace training the employees or offering induction training to their employees.
- (iii) Feed milling companies should consider expansion of businesses so as to enjoy the benefit of mass production at lower costs.
- (iv) Animal feed milling companies should endeavor to adopt mission and vision for their firms and come up with ways to achieve their goals.

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