Using Jovanovich's Learning Effects Model to Predict Advantageous Product among Micro and Small agro-food manufacturing Enterprises in Kenya

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Abstract

Advantageous product is a product with a competitive edge over others in the market. It attracts more revenue for the enterprise, fulfils sophisticated customer demands and is highly differentiated. In this paper, enterprise's size and age influence on advantageous food products for local and export markets are examined. Formality is considered as a moderating factor. The study sampled 132 food-manufacturing Micro and Small Enterprises (MSEs) in Busia and Nairobi Counties. The researcher used Jovanovich's Learning Effect Model to inform the conceptual framework. A seven Likert Scale questionnaire was used to measure the MSEs' gradation in opinion, attitude and behaviour on size, age, registration and how they influenced their advantageous product. Research instruments' reliability was tested by chronbach's alpha and realized 0.97 which was greater than 0.70 showing excellent internal consistency**.** Due to weak information management system of agro-food processors in Busia county, snowballing sampling techniques was used and fisher sampling techniques formula at standard normal deviate of 1.96 on Nairobi County Government given its numerous food manufacturing enterprises. The data was analyzed using moderated Logit model at a corresponding 5% level of significance using Statistical Package for the Social Sciences (SPSS) version 21.0. The study found out that enterprise size, age and registration

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status (as a whole) significantly influenced agro-food processors to produce advantageous product (*wald (1) =41.297, p=.000, sig<.05, 2-tailed)* but not as independent stand alone factor. The study recommends census of all agro-food manufacturing enterprises in Kenya. It also suggests combination of size and age factors in the registration and development of the enterprises. Finally the study recommends establishment of a food and beverage administration authority to support MSEs for export market.

Key terms: Jovanovich's Learning Effect; liability of newness; liability of smallness; Advantageous product; Agro-food processing;

1. Introduction

1.1 Background

Food processing is the practice of changing raw plant and animal materials into edible food products for customers by use of food innovation systems (Monteiro & Levy, 2010). It ranges from ancient processes such as fermenting, sun drying, salting to modern innovation systems such as freezing vegetables, flour milling and fortification. The agro-food processors, for example, transform fresh fruits, vegetables into canned, bottled, preserved, frozen, dried or otherwise into food products for consumption. The transformation practices by the food and beverage industries enhances product shelf-life, minimizes post-harvest wastage and safety risks, creates variety, convenience, nutritional enrichment in the food supply chain.

Food manufacturing sector has recently received unprecedented attention with focus on export-led industrialisation in the world due to its range of benefits. Among the top world exporters of food (i.e. United States, Netherlands, Germany, France, and Brazil), the sector has demonstrated high potential of feeding the souring population, increasing income, and job creation. Whereas USA is the greatest exporter of food with estimated $ 118.3 billion with the sector employing 1.7 million people and forming 15% of all manufacturing, agri-food sector in the Netherlands is considered the top sector contributing substantially to the Dutch economy in terms of GDP with more than $ 79 billion worth of exports, employment generation and innovation (Velthuijsen & Janszen, 2014). According to the Confederation of Agro-food Industries (CIAA), agro-food sector contributed to 60% of the gross production and 11.8% of

employment in European Union. Particularly in Germany, the sector is the fourth largest generating $ 70.8 billion out of export and employing a workforce of over 560,000 people (Germany Trade & Invest, 2015). Agri-food business is the economic mainstay of the French with over 10,000 firms (97% of the Small and Medium Enterprises), a turnover of 163 billion Euros, employing 412,500 workers and exporting 35 billion Euros worth of processed food (FNAFI, 2011). France has been able to achieve this through heavily investing over 1.5 billion Euros in fostering innovation, technology, science and technology transfer. According to FNAFI (2012), France has established a *savairefare* of 10,000 researchers and technicians and agro-food related research organizations including French National Institute of Agriculture and Research (INRA), French National Centre for Scientific Research (NRS), French Food Safety Agency (AFSSA) among others coordinated by French Association for Technical Coordination in Agro-Food Industry (ACTI). France has also become an attractive location for highly active agro-food foreign firms like coca cola, Heineken, Ferrero etc accounting for 30% of agro-food output. The Gain Report described agri-food processing in Brazil as prominent, diverse and modern. The sector contributed 9.5% of the Brazil's GDP and US $ 55.4 billion out of the exports, especially in sugar, frozen concentrated orange juice and coffee (Fonseca, 2015). In Japan, the food manufacturing sector form 10.9% and employs 12.2% of the manufacturing workforce.

In South Africa, agro-food industry dominate agro-processing sector with an output of 42.4%; employing 31.3% and 36.6% value addition between the year 2006 and 2010 (DAFF, 2013). Apart from Ganola and sunflower, most of agro processing (64-74) % is at primary level. Though there were large firms, South African Agro-processing is largely done by SMEs who couldn't meet even the local demand due to inadequate finance, skills and government support. To alleviate the above challenges, the South African Department of Agriculture Forestry and Fisheries (DAFF) established an agreement with public sector stakeholders like dti, and IDC to implement provincial plans. The South African Department of Agriculture Forestry and Fisheries (DAFF) had also developed M&E framework jointly with partners to regularly update information and research on the industry.

According to Regnier (2009), among Least Developed Countries (LDCs), Asian SMEs led in technology-based agro-food processing whereas their African counterparts were still stuck in informal, micro-economic activities

and missing link challenges. In southern Asia, processing technologies were appropriate, cheap and easy to maintain. These advances in technology have been enabled by a *network of specialized agronomic institutes*. Though agro-food processing firms dominate manufacturing industry in sub-Saharan Africa, studies have shown that agricultural production is at 6% and 4.5% processing is at primary level, (Statitistical, Economic and Social Research and Training Centre for Islam Countries, 2010).

Like Brazil, agriculture is the powerhouse of the Kenyan economy. Agro-food processing forms a third of the manufacturing sector: contributing 33.5% of jobs (89219 people) and 33.4% of the total contribution of manufacturing sector which is 10% of the GDP. The sector exports over Kshs.482, 944 million and imports Kshs 106,539 million worth of food and beverages (Munguti, 2013). The role MSEs play is critical not only to the economic development but also to achievement of the Vision 2030 ambitions (Muturi, 2015). However they are faced by multiple challenges associated to their size and age that make not compete effectively in the global market landscape (Ndirangu & Mukulu, 2014).

1.2 Problem statement

The present study attempts to study the relationship between age and size moderated by registration with advantageous food products among MSEs manufacturing foods in Kenya. According to studies, the productivity levels of the MSEs are very low (less than one productivity index) and performing below the global competitiveness (FKE, 2012). Kenya is ranked number 106 out of 139 nations in global competitiveness, lagging behind the tiger nations that it benchmarks herself with (ibid). Efforts to improve productivity and global competiveness among Kenyan food manufacturing MSEs have been attributed to a host of factors including slow adoption of technology, unfavourable policy framework, poor infrastructure, inadequate research and development (Republic of Kenya, 2005). In Kenya, most MSEs have been observed to be performing dismally, with retarded growth and more often don't survive their second birthday (Kamunge, Njeru, & Tirimba, 2014). However, knowledge gap on the smallness and newness of the enterprises which form the majority of the Kenyan food enterprises on productivity and competitiveness still remain uncovered and that is the problem of the present study.

1.3 Objectives

The main aim of this study to find out the relationship between Jovanovich's Learning Effects and the manufacturing of advantageous product among agro-food Enterprises in Kenya. Specifically the study's objectives are:

1. To determine the effect of the enterprise size on manufacturing of advantageous product
2. To examine the effect of enterprise age on manufacturing of advantageous product
3. To find out the mediation effect of formalisation on the relationship between age, size and manufacturing of advantageous product.

2. Literature Review

This section is a critically analysed summarised, classified and compared published knowledge from prior studies and theoretical articles on advantageous products; Jovanovich's learning Model Effects (size and age) and moderating effects of formalization. Despite giving a solid theoretical foundation to this study, literature review is chosen because it makes existing knowledge known and substantiates the availability of the research problem. It also helps in framing the valid research design and justifying the study as a true contributor to the body of knowledge (Levy & Ellis, 2006).

An advantageous product is a product having greater performance over competitors by offering both shareholders and customers greater value. In agro-food processing finding and nurturing an advantageous product can mean increased profits (income), successfully satisfying customer demand and being differentiated from competing brands over a long period of time. The concept advantageous product refers to a competitive product; a product that has an edge over competition. In the study the advantageous product is characterized by market orientation, increased income and differentiation. A product demonstrating superior value for customers while taking care stakeholders interests and responsive to market information fulfils market orientation cue (Langerak, Hultink, & Robben, 2004). Studies on business profitability have proved that market oriented products deliver a sustainable competitive advantage and superior long-run organizational performance (Narver & Slater, 1990) and positively relates to new product performance (Homburg & Pflesser, 2000). Such

products account for 50% and more of the firm's revenue (Han, Kim, & Srivastava, 1998). According to Regneir (2009), market oriented products need to be nutritious, highly value added and knowledge intensive. UNCTAD (2001) and WTO (2013) suggest hi-tech, good packaging, sanitary, quality controls and certification. As observed by Han et al (1998), market orientation is deficient if not combined with other product cues like differentiation and increased revenue.

One of the main tenets of Jovanovich's learning effect model is that resilience and performance of companies is dependent on the age and size of the enterprise. As enterprises evolve in size and age they are invest a lot in product differentiation and customers' satisfaction to out-do their rivals in a globally competitive landscape. But as markets mature, enterprises shift their focus to competing on cost, profitability and efficiency (Cusumano, Suarez, & Kahl, 2007). A recent wave of studies has furthered these concepts describing age and size related crisis as well as highlighting their importance to enterprise's innovativeness and growth (Haltiwanger, Jarmin, & Miranda, 2013). The crises have hence been described as liability of newness and liability of smallness which form the independent variables of this current study.

Liability of newness was coined by Arthur Stinchcombe to explain the struggle of survival of MSEs at their start-up phase (Stinchcombe, 1965). The liability of newness theorists perceived higher failure rate and low global competitiveness among new enterprises than older ones because of lack of resources, low legitimacy levels, higher dependence on cooperation with strangers and unstable structures (Choi & Shepherd, 2005). Low quality products performance and high infant mortality among MSEs has been also explained on inefficient "learning experience" and macro socio-economic structures (Abatecola, Cafferata, & Poggesi, 2012). Other studies have observed lack of reputation, technology, inability to attract skilled workforce and difficult for MSEs to meet high interest rate payments and settling administrative costs to be the reasons for low advantageous products and infant mortality of MSEs (Carayannopoulos, 2009). These challenges are pegged at the three year threshold by most studies (Republic of Kenya, 2005; Kamunge et al., 2014). From 4-8 years, most organisations experience peaceful development interspersed with revolution (Greiner, 1998).

Liability of smallness refers to the fact that enterprises have a higher likelihood of dying when they are small than large because of their

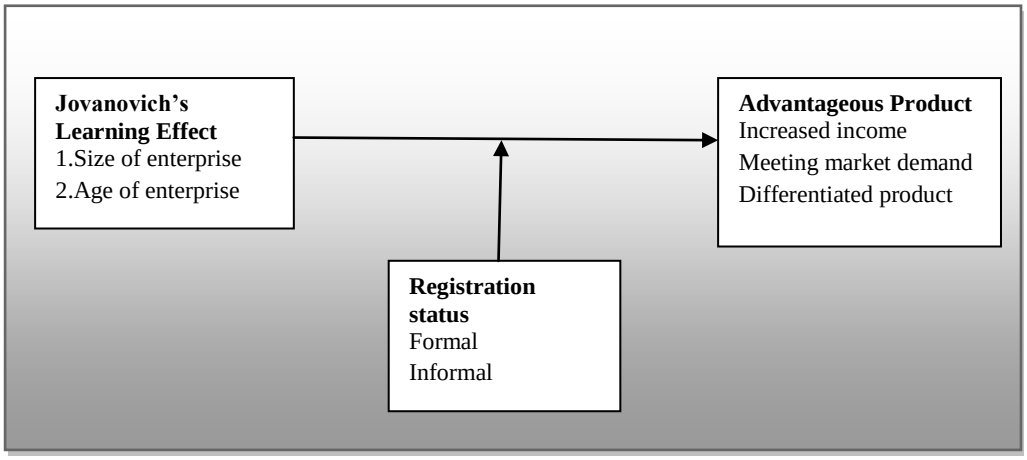
limitedness in resources, capabilities, market presence that weakens their market bargaining power and capacity to withstand environmental shocks (Kale & Arditi, 1998). The enterprise's size or smallness is measured in terms of financial capital amount and number of employs at the start-up phase (Freeman, Carroll, & Hannan, 1983). The limited resources, that is; financial and human capital constrains such companies of strategic manoeuvres in which they can engage at the marketplace advantageously and survive the cut-throat competition. According to Lohrke et al., (2010), the enterprises' commercialisation of products was negatively related to its size. Smallness in size of an enterprise predicted liability in designing advantageous products (Aldrich & Auster, 1986).

In as much as many scholarly literatures associated newness and smallness to poor quality products and mortality challenges, others have found it to be a potential competitive advantage of MSEs (Johanson & Vahlne, 2009). According to Grainer (1998), new and small organisations primarily harbour entrepreneurship-power culture meaning that they are more enthusiastic about creativity, have less bureaucratic infrastructure, accommodative of speedy decision-making (Lohrke, Bird, & Gordon, 2010), product novelty and generational changes (Stradomskyte, Dai, & Hauge, 2012).

Formalness refers to firms that are registered by Government agencies. In other words, registration established informality or formality of the MSEs in agro-food industry. In China unregistered MSEs had lower growth rate and increased illegality (Ayyagari et al., 2010). The unregistered agro-food enterprises are likely to experience poor access to finance and land, crime, theft, disorder and corruption (International Finance Corporation, 2013). Informal agro-food sector also means informal employment to the citizenry; unstable and contract-less employment that is void of social security (ILO, 2012). This variable was used to moderate the relationship between the Jovanovich's learning effect on designing of advantageous products by the MSE manufacturing foods in Nairobi and Busia Counties.

The conceptual framework below explains the effect of Jovanovich's learning effects of size and age and how they relate to highly advantageous products among agro-food processing MSEs moderated by the registration status.

Fig. 2.1: Framework of Jovanovich's Learning Effects on Manufacturing of Advantageous Product



Source: Author 2018

3. Research Design

Research design is a framework detailing the methods of sampling, collecting, measuring and analysing data (Bryman, 2012). The framework intersects philosophical world view, strategies of inquiry and specific methods. The positivist constructivist was the worldview in the understanding the subjective meaning, experiences and perceptions of agro-food processors on food innovations as the measureable scientific phenomena in the food industry. Strategies of enquiry were mixed; combined quantitative and qualitative approaches in answer research questions. Using a both approaches gives an opportunity to fill the weaknesses and capitalise on strengths inherent in each of the methods (Harwell, 2011). The mixed methods involved field survey methods to scientifically sample and design questionnaire that measured characteristics of the population with statistical precision on selected cases of agro-food sector to construct empirical body of knowledge.

The study areas were Busia and Nairobi City Counties in Kenya. Whereas Nairobi was chosen purposefully because of it being the most industrialised county in Kenya, Busia was selected the 44 rural counties using raffle random methods. The population for the study were MSEs manufacturing food products for local and global market. On one hand,

Nairobi had 2070 MSEs and the study subjected it to the Fisher random sampling techniques which resulted into 146 MSEs. Fisher method $n = Z^2pqD/d^2 = (1.96^2 \times 0.05 \times 0.95)2/0.5^2 = 146$. On the other hand Busia County had a poor record of food manufacturing MSEs which prompted the study adopt snowballing techniques that unveiled 26 MSEs. Semi-structured questionnaires were used by trained research assistants were to handle the respondents ethically. Finally, the data was analyzed using moderated logit model by Statistical Package for Sciences (SPSS) version 21.0. The study interpreted the outputs using percentiles, means and tables.

4. Results and Discussion

This section starts with reliability test, then background information of MSEs, Jovanovich's Learning Effects and the relationship between Jovanovich's Learning Effects and advantageous products. All questions scale questions were subjected to Cronbach's test for reliability at predetermined threshold of $\alpha \geq 0.7$. The test generated 0.97 coefficients which was an excellent internal consistency. The background information revealed that most MSEs (51%) were family-owned, (40.9%) were owner-managed and male-dominated. Secondary school education was the highest level for the most managers (34.1%).

4.1 Advantageous Products among Agro-food Processing MSEs

Advantageous product is the dependant variable, whose change is the interest of the study. It is defined by three desired characteristics in agro-food products in a highly competitive market. The characteristics include the food product ability to increase the enterprise's income, meeting market demand and the product being differentiated from other related products. Increase in income is a quality that addresses profitability. Meeting market demand is a quality that addresses product performance; having ability to satisfy the customer's tastes and preference at the market. Differentiation is a cue that addresses product uniqueness and comparative advantage. The study explained the advantageous products as a whole (**y**) and as parts increase in income, meeting market demand and differentiated products. Change in the whole and its parts were controlled by change in the values of independent variables which are size and age of the enterprises.

The variable (advantageous product) was measured by ordinal data on a Likert scale of 7 point. Its value was expressed as an index which was

derived as a result of each respondent's highest score divided by the maximum expected score(49) forming a y indices table. The table had 132 entries (rows) indicating 132 respondents and seven columns indicating number of questions enquiring on whether the products increased the firms income, met market demand and were differentiated. The scale was collapsed into two, which is; 0 and 1. The reason for collapsing was because the study preferred Logit regression model which is binary in nature. For example, indices that fall on zero (0) side meant that the products were not highly advantageous and indices that fall on1 side meant that the agro-food product demonstrated highly advantageous to the MSE. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1. According to indices table, only two respondents (respondents 4 & 58) scored less than 0.5 indices. This implied that over n=130(98.5%) of the respondents agreed that the products increased the MSEs' incomes. Second were differentiated products with 126(95.4%) respondents accepting that the products were differentiated and third was meeting market demand with n=125(94.7%) of the agro-food manufacturers agreeing that the products met the market demands. The study also determined the amalgamation of the three variables showed that n=130(98.5%) of the micro and small agro-food manufacturers agreed that their products were Advantageous.

The study also considered the micro and small agro-food enterprises characteristics which include registration status, age, period of operation, annual sales turnover, staff establishment and networks as key characteristics of MSEs manufacturing functional food products.

4.2 Relationship between Enterprise's Age and Manufacturing Advantageous Products

The survey on 132 MSEs in Busia and Nairobi, found out that (61.3%) of the firms had been in operation for less than 3 years. The study further sought to determine if the age had anything do go by in manufacturing highly performing advantageous food products using the Logit regression model because of its inherent ability to describe the relationship between one or more predictors. The likert scale answers were collapsed into dichotomous responses and regressed as shown below:

$$p/(1-p) = \beta_0 + \beta_1 * \text{Age of the enterprise} + \text{stochastic error term}$$
$$p/(1-p) = 3.55 + 0.522 * \text{Age of the enterprise} + 0.717$$

The equation above indicated for every one unit increase in age of the enterprise a positive change in likely in manufacturing a more advantageous product. The study also sought to find out if the influence was significant but the results were: *Wald (1)* =0.522, *p=.673, sig>.05, 2-tailed.* The p value =.673 is above 0.05 the permissible value of likelihood above which null hypothesis is accepted. The implications were that *enterprise age had no statistical significant influence on the making of advantageous product by MSE in Food Manufacturing*. The findings are contrary to many similar studies which linked success and performance significantly to age of an enterprise (Kamunge et al., 2014; Staines, 2005; Mengiste, 1998). It warrants concluding that though failure rate is likely, innovation in food manufacturing is not significantly affected by the age of an enterprise, a fact confirmed my other studies in evolution of enterprises (Johanson & Vahlne, 2009; Grainer, 1998; Lohrke et al., 2010; Stradomskyte et al, 2012).

4.3 Relationship between Enterprise's Size and Manufacturing of Advantageous Products

The sampled data also revealed that most of the firms (65.9%) had annual sales turnover of Kshs 0-500,000, permanent staff of between 1-10 employees (78.8%), majority (48.5%) of whom were natives from the county; a clear indication that they were Micro and Small enterprises as per the definition of the SME Act in Kenya. These finding agrees with the study by Deakins & Freel (2012) that most enterprises in the economy are MSEs. In effort to establish whether relationship existed between size and manufacturing of advantageous products, 132 sampled responses were dichotomized and regressed as shown below.

$$\mathbf{p/(1-p) = \beta_0 + \beta_1 * Size\ of\ the\ enterprise + stochastic\ error\ term}$$
$$\mathbf{p/(1-p) = 3.39 + 17.813 * Size\ of\ the\ enterprise + 0.587}$$

The model implies that everyone increase in the size of an agro-food enterprise is associated with a positive change of 17.813 and a more highly manufactured advantageous product. The study also sought to find out if the association was statistically significant. The findings showed a *wald (1)* =0.00, *p=.998, sig>.05, 2-tailed.* The p value =.998 is above 0.05 the permissible value of likelihood above which null hypothesis is accepted. The implications were that *enterprise size had no statistical significant influence on the making of advantageous product by MSE in Food Manufacturing*. From

the Jovanomich's Learning Effect Model, Mangiste (1998) agrees that the smallness of an enterprise was a liability of its efficiency and endurance. In comparison with large businesses, MSEs have been found to be more innovative due to their flexibility and responsiveness to change, able to overcome resource constraints and produce value-added products with minimal labor costs (Deakins & Freel, 2012). However, they are not capital intensive with limited capacity to diversify their financial risks, develop own ideas through their own internal research and enjoy economies of scale (Stokes et al., 2010), a fact confirmed by this study results.

One way to overcome liabilities of newness and smallness is to encourage small enterprises to be environmentally certified. Certification makes small enterprises accumulate legitimacy and repute among stakeholders. Studies have also proved that such companies have registered higher levels of effectiveness and profitability when they have environmental certification than when they are not (Djupdal & Westhead, 2015). Another is use of guanxi social capital techniques in acquiring human capital (Ko & Liu, 2016). Guanxi is a Chinese social capital network that small companies could use conveniently in recruiting right human capital. Thirdly, stinchcombe(1965) suggested building of mutual confidence (trust) through alliance or collaboration formations. Among small manufacturing enterprises, collaboration makes enterprises achieve collective efficiency that would ultimately accumulate capital, attract infrastructure development, acquisition of right technologies for competing in a global market (Ng'ang'a, Onyango, & Kerre, 2011). This study survey revealed that most MSEs n =75, (56.8%) were members of trade associations. About 73% of the MSEs perceived value in the networks implying network concept worked for them. As described by Latour (1987), innovation spatially and temporarily diffuses from its source to many other actors in a social system. Where actors are not networked the process would be hampered. According to Krugman (1991) and Roeland & Hertog (1999) such enterprises networks supplied knowledge, facilitated exchange of business information, technological expertise, innovation and increased returns and shared customers.

4.4 Formalness of Agro-food Processors

The study observed inadequate attention by Busia and Nairobi County Governments to address the MSEs' prosperity. It revealed that slightly over 50% of the firms were registered, though they contributed to the county

revenue baskets, despite food manufacturing sector making significant contribution to economic growth through providing jobs, lower labour productivity and value-addition (Deakins & Freel, 2012). Registration was used to establish informality or formality of the MSEs in agro-food industry. This means that formal economy is equal to the informal economy in the two counties. Evidence from China show that unregistered MSEs had lower growth rate and increased illegality (Ayyagari et al., 2010). The unregistered agro-food enterprises are likely to experience poor access to finance and land, crime, theft, disorder and corruption (International Finance Corporation, 2013). Informal agro-food sector also means informal employment to the citizenry; unstable and contract-less employment that is void of social security (ILO, 2012). As observed by Chen (2007), most MSEs are informal due to the exorbitant costs of complying with regulations (Chen, 2007). Because of the residual and complementary role the informal agro-food enterprises play in rejuvenating the economy and creating employment, it is of paramount important for the public, private and multilateral stakeholders to rethink and incentivise the informal businesses into formal sector.

4.5 Relationship between Jovanovich's Learning Effect and Advantageous Product

The study collapsed the likert scale answers into dichotomous responses and analysed to ascertain whether agro-food processors developed advantageous product or not. In that regard, a logit model was preferred because its inherent ability to describe the relationship between one or more independent variables (e.g. age, size and registration) where there is a dummy response variable – advantageous product expressed in probability form. The model was also chosen because of its simplicity and its ability to take many predictors underlying **Jovanovich's Learning Effect Theory.** Size and age predictor variables and registration as an intervening variable were fitted in a logistic regression model as shown below.

$$\text{logit}(p) = \log(p/(1-p)) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \varepsilon$$

Where; $\text{logit}(p) = \log(p/(1-p))$ = Food product is advantageous

X_1= size of the enterprise

X_2= age of the enterprise

X_3= registration status of the enterprise

b_0 = Coefficient of the model

b_1-b_3= Beta Coefficients of Determination
ϵ = stochastic error term

$p/(1-p) = \beta_0 + \beta_1$*size of the enterprise + β_2***age of the enterprise** + β_3***Registration status of the enterprise** $+ \varepsilon$

At a confidence level of 95% or P-value of 0.05 significance levels, the study processed 132 cases out of which 129 were positive responses. For every trial the study assumed a probability of 97.7% of positive responses. The distribution of R was the Binomial distribution with parameters 132 and 97.7%. Based on this, the study computed corresponding p for each of each advantageous product using coefficients a & b.

Table 4.1: Parameters of Jovanovich Learning Effect Variables in the logit Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age (x1)	-.145	1.261	.013	1	.908	.865
	Size (x2)	16.454	5428.949	.000	1	.998	13989951.651
	A7registered(1) (x3)	17.546	4544.789	.000	1	.997	41694013.235
	Constant	2.918	.726	16.154	1	.000	18.500
a. Variable(s) entered on step 1: Age, size, A7registered.							

The results shown in the table 4.16 can be fitted in the equation as;
$\log(p/1-p) = 2.918 - 0.145X_1 + 16.45X_2 + 17.55X_3 + 0.726$

The results of the regression equation show that if all Jovanovich's Learning effects were rated 0; advantageous product of MSEs in agro-food manufacturing would be 2.918. Only one of the Jovanovich's learning effect (size) had a positive relationship with the advantageous product. For every one-unit increase in age score (so, for every additional year on the enterprise age), a -0.145 increase in the log-odds of advantageous product is expected, holding all other independent variables constant. Every one-unit increase in size score, a 16.454 increase in the log-odds of advantageous product is expected, holding all other independent variables constant. Finally, every one-unit increase in registration score, a 17.546 increase in the log-odds of advantageous product is expected, holding other independent variables constant. According to the results, no single variable had a

statistically significant influence on advantageous product: age (p = .908), size (p = .998) and registration (p = .997). However, overall the study showed *Wald (1)* =41.297, *p=.000, sig<.05, 2-tailed.* The p value =.000 is below 0.05 the permissible value of likelihood above which null hypothesis is accepted. The implications were that *enterprise size, age and registration (combined) significantly influenced advantageous product by MSE in Food Manufacturing*.

Further the study assessed the predictive strength of the logistic regression model. The aim was to find out how well the model could predict the advantageous product based on Jovanovich Learning Effect Model. Using SPSS the study used Cox& Snell Pseudo – $R^2_{c\&s}$ = .039 and because $R^2_{c\&s}$ cannot reach 1, Nagelkerke modified it by increases the Cox and Snell version to make 1 a possible value for R-squared by dividing $R^2_{c\&s}$ by its upper bond. Based on the model, deviance in the advantageous products ranged from 3.9% to 19.9%, depending on whether the Cox & Snell R^2 reference or Nagelkerke R^2 methods, respectively. The model is considered good and fit to predict advantageous food product using Jovanovich's Learning Effect Model because the pseudo R^2 are between 0 and 1.

5. Conclusions and Recommendations

The objectives of this study guided the conclusions. The study found significant association of manufacturing advantageous product with size and age as a mix moderated by registration. The model was confirmed to be fit for studying size and age in the MSEs manufacturing advantageous food product.

The following recommendations were made based on the findings of the study:

i) National Government should form Agro-food processing authority to promote survival and competitiveness of MSEs manufacturing foods
ii) Agro-food MSEs and County governments should leverage on social networks to achieve trust, collective efficiency and competitiveness
iii) Programmers in food manufacturing industry should consider size, age and registration as a mix and pack if they have to promote MSEs produce advantageous food products in a globally competitive market.

Suggestions for Further Study

Following the findings and conclusions the study suggests the following for further research:

i) The extent to which restructuring MSEs into social networks influenced the MSE manufacture advantageous food products
ii) Also consider studying various aspects of enterprise size and their influence on performance of small agro-food processors.

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