Effects of Value Chain Design on Performance of Improved Indigenous/Kienyenji Chicken in Kirinyaga County

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Abstract

Access to inputs would potentially aid in achieving desired output for improved chicken farmers. This study investigated the effect of value chain design on performance of improved indigenous (kienyeji) chicken in Kirinyaga County. Descriptive research design was applied and primary data gathered among 103 respondents. Data was analyzed using descriptive and inferential statistics. Production of improved kienyeji chicken in Kirinyaga County was positively affected by inbound logistics, operating, outbound and support activities. Provision of requisite inputs that would optimize performance of improved indigenous chicken in Kirinyaga County.

Introduction

Agricultural contributes 24 to 26% of Kenyas Gross Domestic Product (Mutua, 2018). According to KIPPRA (2013), agriculture accounts for at least 65% of total export with 18% and 60% of formal and informal employment respectively. The sector is volatile since only 25% is carried out in large scale hence most farmers are exposed to challenges associated with small scale farming. Since the sector provides a source of employment in rural areas, there is need for optimization of production to achieve n food security and promote growth and development in rural areas.

Indigenous chicken produce approximately 30% of total meat consumed worldwide (Food and Agricultural Organization [FAO 2012). These chicken comprise of 70% of total chicken in Africa (FAO, 2011). In Kenya chicken farming is carried out by rural Kenyans and currently there are approximately 31 million birds. Of these 75% are indigenous, 22% broilers and layers and approximately 1% breeding stock (Mutua, 2018). These farming models minimize odds of achieving optimal production capacity. The sector can achieve more value if managed through value chain approach.

Although the government and Ngos have trend up to 10,000 farmers on value, safe poultry management practices and bio-security in Kirinyaga County. There is limited compliance with vaccination programmes with at most 20% having complied with farm infrastructure development (MESPT, 2015). This has been blamed on lapses in inbound activities, operational, outbound and support activities. Moreover, there are up to 90% mortality rates within the first six weeks due to poor housing, insufficient and unreliable water supply, parasites and lack of quality feeds. Further, there have been low compliance with biosecurity requirement among farmers (MESPT, 2015). Farmer's access to market is low because the average price of eggs is Ksh 300 to 450 per tray while mature hens retail at Ksh.500 and cockerel at Ksh. 800. These prices are not profitable and, in most instances, breakeven point is rarely met.

The situation is different in urban areas where the demand for indigenous chicken is high. This is due to social economic characteristics, health concerns and demand for white meat (Mengesha, 2012). There is need to support small scale farmers to enhance their production and income through effective value chain management. In some instances, the chickens lay first egg after 230 days while others fail to achieve the desired weight of 2.2 kg and 1.6kg for male and female respectively since small scale farmers lack access to veterinary services, farm management skills, access to technology and adequate capital to finance agricultural activities. We examined the effect of value chain design on production of improved indigenous chicken in Kirinyaga County. The objectives of this study were to evaluate effects of logistics, operational, outbound and support activities on production of improved indigenous (kienyeji) chicken in Kirinyaga County.

Concept of Value Chain

Value chain model concept advocates for network management approach with an aim of achieving competitive advantage from horizontal and vertical market linkages. Horizontal linkage is a link between two or more market participants and vertical linkages are created through interrelationships between stakeholders who are involved in different production stages.

This value chain tracks a product from its pre-production to consumption. Players in value chain process are raw material providers, processors, producers, suppliers and retailers. This process is relational and its success is based on capacity for optimal running of business primary activities. The chain commences with inbound logistics and terminates with service. The loop is complete through the link between pre-production stakeholders and product consumers as presented in the flow chart below; (Figure 1)

Inbound Logistics → Operations → Outbound Logistics → Marketing and Sales → Service

Figure 1: Value Chain Model

The basic principle of value chain design is that companies operate in areas where they enjoy competitive advantage and should be geared towards achievement of competitive advantage. In indigenous chicken production, inbound logistics include support and training of farmers, provision of farm input, breed selection, provision of drugs and support on feeding programs. Operations activities include collection of output, provision of storage facilities, and provision of product transport and maintenance and repairs. Outbound activities include support on market development, sales and marketing activities, consumer information gathering and customer relationship management. Marketing, sales and service include infrastructure support, human capital development, equipment financing, provision of financial support and support of procurement practices (Tittiane, 2013).

Literature Review

Value chain theory can be adopted as a tool for evaluation of competitive advantage and approaches to be adopted to exploit opportunities presented. The model segregates organization activities into input process, production, marketing and distribution. In agribusiness, farmers are expected to invest in inbound logistics through attendance of seminars, sourcing of farming inputs, selection of breeds, support on feeding programs; operating activities through collection of outputs, access to transport and warehousing facilities and maintenance and repair of infrastructure. Farmers should in addition, seek outbound activities through support on market development, consumer information and

customer relationship management to improve access to veterinary services hence decreased mortality rate, age of laying first egg and quality of eggs produced.

Murangiri, et al (2016) evaluated extension services provided to farmers in Katulani district in Kitui County and reported that agricultural extension services were only available to 50% of poultry farmers and recommended that government policies should be fully implemented to support provision of extension services to farmers. Elsewhere Tittiane (2016) investigated the effect of entrepreneurial value chain on performance of small-scale dairy farmers and observed notable production improvement due to adoption of entrepreneurial value chain approach. It was recommended that to dairy farming among small scale farmers could be improved through adoption of value chain strategies and introduction of policies to support access to financing to stakeholders involved in dairy farming activities. In yet another study, Bolo, et al (2009) investigated the effectiveness of value chain system design on performance of selected producer dairy owned groups in Kenya and highlighted the need for external stakeholder to ensure that all opportunities available to farmers were fully executed.

Emilia et al (2014) assessed performance of food value chains as a mechanism for identification of response mechanisms and demonstrated notable performance changes in local and global food value chain. Local performance recorded higher growth in health and social dimensions and the need for creation of shared value chain recommended was identified as a tool to optimization performance.

Kamau (2018) investigated the effect of improved technologies on production of small-scale holders in Kakamega and Makueni Counties and demonstrated that adoption of technology had positive effect on egg production and highlighted the need for evaluation of policies to improve on quality of network among different stakeholders involved in chicken farming and development of measures aimed at enhancing market access ought to make the venture profitable.

Magothe et al (2012) evaluated current status of indigenous chicken production in Kenya and argued that indigenous chicken was prematurely reared by low-income earners, indigenous chicken farming was common among low-income earners since their production costs were lower especially when farmed in free rang model and further observed that optimal production is achieved due to lack of capital and highlighted the need for joint effort among different stakeholders to improve production.

Mutua (2018) investigated challenges associated with indigenous chicken production and adoption of biosafety systems in Makueni County on production and observed that production was hindered by inadequate biosecurity knowledge, high production cost, poor or inadequate housing, and poor access to chicken market. There was need for sensitization through available networks such as radios to optimize production capacity of indigenous chicken farming.

In another study, Ali (2019) investigated the effect of working capital management on performance of listed agricultural companies in Nigeria from 2007 to 2016 and observed that
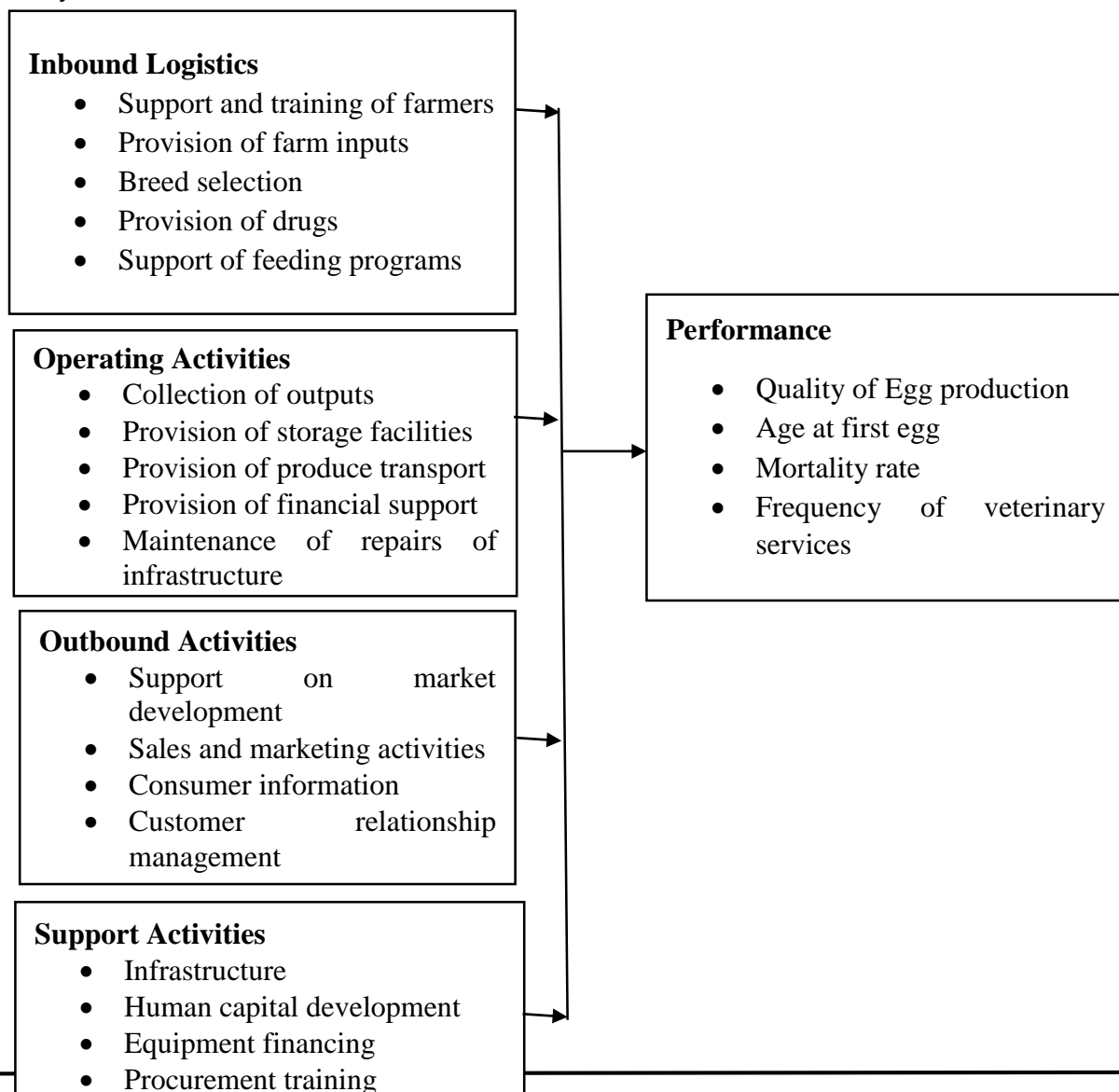
accounts payable ratio negatively affected performance while accounts receivable and inventory ratios positively affected performance and that cash conversion cycle negatively impacted performance of listed agricultural companies. There is need for provision of working capital to enhance performance of players in agricultural sector.

Conceptual Framework

The study hypothesized that production of improved indigenous chicken in Kirinyaga County is dependent on inbound logistics, operational activities, out bound activities and support activities. The conceptualized relationship is as shown in Figure 2

Research Methodology

The study adopted descriptive research design (Sekaran and Bougie 2013) to investigate the effect of value chain design on performance of indigenous chicken farming in Kirinyaga County.

Inbound Logistics
- Support and training of farmers
- Provision of farm inputs
- Breed selection
- Provision of drugs
- Support of feeding programs

Operating Activities
- Collection of outputs
- Provision of storage facilities
- Provision of produce transport
- Provision of financial support
- Maintenance of repairs of infrastructure

Outbound Activities
- Support on market development
- Sales and marketing activities
- Consumer information
- Customer relationship management

Support Activities
- Infrastructure
- Human capital development
- Equipment financing
- Procurement training

Performance
- Quality of Egg production
- Age at first egg
- Mortality rate
- Frequency of veterinary services

The target population comprises of 300 indigenous chicken farmers from various farmers' groups that have been formed to aid in value addition while souring inputs and selling produce. Simple random sampling was considered while selecting the respondents. A sample of 103 respondents was considered and determined using Yamane formula (Yamane, 1967) as follows; n = N / [1 + N (e)2] Where n is the sample size, N is the population size, and e is the level of precision.

n = 300 / [1 + 300(0.08)^2] = 103

Primary data was collected through self-administered questionnaires while some administered through use of telephones.

Data was analyzed through descriptive and inferential statistics. Descriptive statistics adopted included mean, standard deviation and coefficient of variation while inferential statistics adopted included correlation to show the strength of the effect of value chain design and performance. Multiple regression analysis was carried out to show the nature of the effect of value chain design and performance of improved indigenous chicken farming in the County.

Findings and Discussions

The first objective of the study examined the effect of inbound logistics on performance of improved indigenous chicken in Kirinyaga County. The respondents were requested to indicate their level of agreement on five-point Likert scale ranging from strongly agree to strongly disagree. Mean, standard deviation and coefficient of variation were used to analyzed the data. Majority of respondents indicated that their groups organized training programs on chicken management (mean = 3.9, standard deviation 0.8) and that they frequently attend seminars on how to manage operational costs (mean = 3.8, standard deviation = 1). Farmers were able to access farm inputs through farming groups (mean = 3.7, standard deviation = 0.6) and selected breeds that were responsive to their needs (mean = 4.1, standard deviation = 0.5). Respondents participated in continuous improvement of their breeds through feedback (mean =3.8, standard deviation = 0.4). Farmers organization had aided farmers to access requisite drugs for their productions process (mean =4.2, standard deviation = 0.7) and had access to quality feeds since they produced their own (mean = 3.9, standard deviation = 0.7).

Table 1: Descriptive Statistics on Inbound Logistics

	Mean	Std. Dev	CV
Our group organizes training programs on chicken management	3.9	0.8	4.9
We frequently attend seminars on how to manage operational costs	3.8	1	3.8
Through our group we are able to access farm inputs	3.7	0.6	6.2
Our selection of breed is based on response to our needs	4.1	0.5	8.2
Through our group we participate in continuous improvement of our breeds	3.8	0.4	9.5
We are able to access requisite drugs through our organization	4.2	0.7	6.0
We are able to feed our birds with quality feeds since we produce on our own	3.9	0.7	5.6

The second objective of the study was to investigate the effect of operating activities on performance of improved indigenous chicken in Kirinyaga County. Majority reported that they had formed platforms for eggs collection (mean = 3.6, standard deviation = 0.8) (Table 2), that collective eggs collections improved their price bargaining capacity (mean = 3.9, standard deviation = 0.7) and that they had managed eggs storage costs due to formation of groups (mean = 3.8, standard deviation = 0.6). Majority of respondents planned transport and logistics of their eggs (mean = 4.1, standard deviation = 0.9), had accessed financial support through their and maintained their infrastructure (mean = 3.6).

Table 2: Descriptive Statistics on Operating Activities

	Mean	Std. Dev	CV
We have formed eggs collection platforms	3.6	0.8	4.5
Our collective egg collection improves our price bargaining capacity	3.9	0.7	5.6
We have managed eggs storage costs due to formation of groups	3.8	0.6	6.3
We have managed to plan on transport and logistics of our eggs	4.1	0.9	4.6
We manage to access financial support through our groups	3.5	0.8	4.4
We manage to maintain our infrastructure	3.6	0.7	5.1

The third objective evaluated the effect of outbound activities on performance. Majority of respondents continuously brainstormed on market improvement strategies (mean = 4.2,

standard deviation = 0.8) and formed marketing teams to distribute eggs (mean = 4.2, standard deviation = 0.7) and adopted research approaches to gathering their client's information (mean = 4.1, standard deviation = 0.6) and managed to identify consumer patterns through packaging and distribution of eggs in different outlets (mean = 3.9, standard deviation = 0.5) and developed strategies (mean =3.8) for healthy relations with their customers due to professional management.

Table 3: Descriptive Statistics on Outbound Activities

	Mean	Std. Dev	CV
We continuously brainstorm on market improvement strategies	4.2	0.8	5.3
We have formed marketing team to distribute our eggs	4.2	0.7	6.0
We have adopted research approach to gather our client's information	4.1	0.6	6.8
Through packaging and distribution of eggs in different outlets we have managed to identify patterns	3.9	0.5	7.8
Due to professional management approach we have developed healthy relations with our customers	3.8	0.8	4.8

The fourth objective of the study evaluated the effect of support activities on performance. Through their groups, members had learnt how to construct quality infrastructure (mean = 3.8) and improved development of human capital (mean of 3.9). They managed to access equipment through financing by financial institutions (mean = 3.7) and learnt procurement procedures. Majority (mean = 4.1), had developed optimal supplier management procedures to enhance their procurement criterions mean = 4.1.

Table 4: Descriptive Statistics on Support Activities

	Mean	Std. Dev	CV
Through our groups we have learnt how to construct quality infrastructure	3.8	0.8	4.8
Through our groups we have managed to develop our human capacity	3.9	0.7	5.6
Through our groups we have managed to procure equipment through financial institutions financing	3.7	0.6	6.2
Through our groups we have learnt procurement approaches to be followed	3.6	0.5	7.2
We have developed optimal supplier management procedures	4.1	0.6	6.8

Majority (mean = 4.2) had improved on quality of their eggs and achieved the first egg on the 125th day. There was decrease in chicks' mortality (mean = 4.2) since majority accessed reliable veterinary services (mean = 3.8, standard deviation = 0.8).

Table 5: Descriptive Statistics on Performance of Improved Indigenous Chicken

	Mean	Std. Dev	CV
We have improved on quality of our eggs	4.2	0.8	5.3
We have managed to achieve first egg production by 125fh day	4.1	0.9	4.6
The mortality rate of our chicks has decreased	4.2	0.7	6.0
We now have reliable access to veterinary services	3.8	0.8	4.8

Correlation analysis was carried out to evaluate the strength of the effect of value chain design on performance. Results (Table 4.6) demonstrated positive and significant effect of inbound logistics on performance of improved indigenous chicken (rho = 0.652, p value <0.05). Both operating (rho = 0.736, p value < 0.05) and outbound (rho = 0.751, p value < 0.05) as well as support activities (rho = 0.674, p value < 0.05) had positive and significant effect on performances. (Table 6).

Table 6: Correlation Analysis

		Performance	Inbound logistics	Operating activities	Outbound activities	Support activities
Performance	Pearson Correlation	1	0.652**	.736**	.751**	.674**
	Sig. (2-tailed)			0.00	0.00	0.00	0.00
	N			80	80	80	80
Inbound logistics	Pearson Correlation		1	.496**	.326**	.561**
	Sig. (2-tailed)				0.00	0.003	0.00
	N				80	80	80
Operating activities	Pearson Correlation			1	.414**	.457**
	Sig. (2-tailed)					0.00	0.00
	N					80	80
Outbound activities	Pearson Correlation				1	.542**
	Sig. (2-tailed)						0.00
	N						80
Support activities	Pearson Correlation					1

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

Model summary on Table 7 has an R squared of 0.679 that indicates that 67.9% of changes in performance can be accounted by inbound logistics, operating activities, outbound activities and supporting activities and that 32.1% of changes in performance can be accounted by other aspects excluded in the model.

Table 7 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.824	0.679	0.493	0.995

Analysis of variance on (Table 8), demonstrated significant effect of inbound logistics, operating activities, outbound activities and support activities on performance.

Table 8 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	15830.44	4	3957.61	20.206	0.000
Residual	14689.45	75	195.859		
Total	**30519.89**	**79**			

Regression coefficients (Table 9) demonstrated that inbound logistics had positive and significant effect on performance ($\beta = 0.504$, p value < 0.05) implying that unit increase in inbound logistics increases performance of indigenous chicken while holding constant operating, outbound and support activities constant. Secondly, there was a positive and significant effect of operating activities on performance ($\beta = 0.557$, p value < 0.05). This implies that unit increase in operating activities leads to an increase in performance by 0.557 while holding constant inbound logistics, outbound activities and support activities. Outbound activities have positive and significant effect on performance ($\beta = 0.165$, p value < 0.05) demonstrating that unit increase in outbound activities is associated with 0.165 units of performance while holding constant inbound logistics, operating activities and support activities. Equally support activities had positive and significant effect on performance ($\beta = 0.377$, p value < 0.05) implying that unit increase in support activities increases improved indigenous chicken performance by 0.377 units while holding constant inbound logistics, operating activities and outbound activities.

Table 9: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	37.155	6.057		6.134	0.000
Inbound logistics	0.504	0.09	0.744	5.616	0.000
Operating activities	0.557	0.113	0.624	4.936	0.000
Outbound activities	0.165	0.074	0.221	2.227	0.029
Support activities	0.377	0.086	0.479	4.387	0.000

Conclusion and Recommendations

From the findings of this study, it can be concluded that production can be improved through provision of inbound logistics through support and training of farmers, provision of farm inputs, selection of breeds, access of drugs and support through feeding programs. There is also need for involvement in operating activities such as collection of outputs, provision of storage facilities and produce transport, financial support and maintenance and repairs of infrastructure. Additionally, there is also need for provision of farmers supports though outbound activities such as support on market development, sales and marketing activities, provision of consumer information and customer relationship management. Improved kienyenji chicken farmers should in addition be provided with support activities that would aid in human capital development and minimize level of risk exposure among farmers.

There is need for formation of farmers' cooperative societies to aid in access of various services in the value chain process and trained on working capital market principles so to minimize odds associated with holding excess stock, access of cash at higher costs and likelihood of mismatch between accounts payable and receivables number of days. Further, there is need for consideration of measures aimed at matching customer needs with respective farmers' group production capacity.

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