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The influence of an entrepreneurial value chain on performance of smallholder dairy farmers

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Abstract: Smallholder activity is the backbone of the agricultural sector and plays an important role in Kenya's economy. As the Republic of Kenya (R. oK.), donors and development agencies concert their efforts to grow the agricultural sector in Kenya, most of the interventions are designed to adopt the value chain approach and appreciate that the beginning of the value chain is an integral part of its success, the smallholders. There has been a deliberate focus by United States Agency for International Development (USAID), to develop the dairy value chain and the agency has designed an entrepreneurial value chain concept to improve the performance of smallholders. This study attempted to understand whether entrepreneurial value chain drivers, namely, access to incentives (finance), training and access to production resource had influenced the performance of smallholders within the dairy value chain .The USAID entrepreneurial value chain projects have a total of 70 smallholder dairy farmers who formed the sampling frame for this study. The researcher used purposive sampling to identify a sample size of 50 smallholder dairy farmers based in Eldoret. A semi-structured questionnaire was the main instrument used to collect primary data from a total of 49 out of 50 respondents; this is a 98% response rate. Data was analyzed using Statistical Package for Social Science (SPSS) version 20, to test the relationships in the conceptual framework. Data was presented in narratives and tables. The study established that training had to a greater extent improved the performance of smallholders; this was followed by access to incentives and then production resources. In respect to what aspects of their production increased, the smallholders indicated that a larger impact was reflected on improved quantity of milk followed by increased revenue, increased herd and lastly increased milk quality. The recommendations drawn from the study were in two categories, further research and best practice. Further research is recommend to establish whether the entrepreneurial value chain drivers have an impact on other value chain actors higher up the dairy chain. This finding would be used to identify which entrepreneurial drivers can be introduced across the chain and assist in developing a sustainable diary value chain. There is also need for further research to determine whether the entrepreneurial value chain would improve performance of smallholders in other agricultural value chains. As for best practice, the study revealed empirical evidence on the positive implication of entrepreneurial driving opportunities on smallholder performance, hence justification for a widespread adoption of entrepreneurial value chains as interventions that support smallholders especially within the dairy value chain.

Keywords: Smallholders, Entrepreneurial Value Chain, Production Resources, Incentives, Training, Performance

1. Introduction

Prior to 2005, micro and small agricultural enterprises were not recognized under the country's Micro and Small Enterprises (MSEs) umbrella, however, Sessional Paper No. 2 0f 2005 laid out the policy framework for support to MSEs recognizing them as dynamic private sector players and not a residual sector; in this sessional paper, the government expanded its previous definition of the term MSEs to include farm based enterprises [1] According to Agricultural Sector Development Strategy (ASDS), Agriculture is the mainstay of Kenya's economy and one of the main contributors to the country's Gross Domestic Product (GDP), it directly contributes 26 per cent of the GDP annually and another 25 per cent indirectly [1].

In his study on growing smallholder agribusiness [2] indicates that for this investment to take hold, agriculture, whatever size, must be seen as a business emphasizing the need to assist subsistence farmers transform themselves to agribusiness entrepreneurs. However, poor rural producers need incentives to think entrepreneurial, these include but are not limited to: infrastructure and roads; irrigation and storage

systems for their products; communication and technologies to receive and share the latest information on prices and access to rural financial services so that they are able to establish viable agribusinesses [3]. In Kenya, dairy farming is an important source of livelihood for about 650,000 small-scale farmers [4]. As noted by [5], 70% of the country's milk production is from smallholder farmers and the dairy sub sector contributes about 3.5% of our country's GDP.

A conclusion by [6], states that the value chain approach has been re-discovered recently by the international and development community, and though the theories about value chain interventions such as transmission and adoption of knowledge; innovative finance and resources provision aren't very new, there is hardly documentation or empirical evidence indicating that the interventions strengthen the value chain actors, especially smallholders. This study looked at the dairy value chain in Eldoret where the farmers have so far been exposed to various entrepreneurial triggers with a bid to increase their efficiency and growth as micro enterprises. The link between entrepreneurial driving opportunities in the dairy value chain and improved performance of smallholder farmers within the value chain is not well academically explored and this research will add to existing literature on the impact entrepreneurial value chains on dairy smallholders.

2. Main Body

2.1. Conceptual Framework

The conceptual framework looked at the entrepreneurial approach, where the growth of smallholders was dependent on their access to training, production resources and incentives (with specific attention to finance), these three being the independent variables. The dependent variable is smallholder performance; whose measurement indicators would be operational growth and improved quality [7].

2.2. Value Chain Interventions

Based on the finding of [6], value chain interventions are business related activities that development actors, NGOs, private sector and governments introduce and/or promote within the value chain to increase its capacity. Governments and donors, realizing that upgrading the performance of individual firms can best be achieved in the context of market-based rewards for improved performance; have shown significant interest in value chain approach to improve productivity, competitiveness, entrepreneurship, and the growth of micro enterprises, with a special focus on smallholders [8].

The study by [9] notes that value chain interventions are mostly centered on flows of material resources, finance, knowledge and information between buyers and suppliers. This point of view was further supported by [10], who pointed out that the provision of services such as finance, training, production resources, etc. enhance the development of smallholders capabilities which can stimulate the development of sustainable market linkages.

2.2.1. Training

For Kenyan agriculture to grow, Kenya needs to invest in agricultural production at all levels of the supply chain from farming, research and extension to processing and marketing , through appropriate training modules; impacting current knowledge and upgrading the smallholders level of skill [1]. This statement has further been supported by [11], who while investigating the integrated development of value chains noted that training should not only focus on the introduction of new skills, but also strengthen and harness knowledge in order to strengthen the production capacity of smallholder farmers.

The way that knowledge is transferred is determined by the information flows or linkages between actors within a value chain [12]. However, smallholder farmers are rarely privy to knowledge available in the market, according to [10] , his research on value chain development, established that farmers have detailed knowledge of their land but lack basic information on good practice and basic management of their produce be it crop or animals, yet this information can be availed even via a mobile handset.

A study by [13], on financing and services for smallholder farmers, indicated that value chain linkages that only concentrated on building skills at processor organization levels and above and not farmer levels did not meet their sustainability goal, the study shows that building skill at farmer level is key as it improves the quality of production.

2.2.2. Incentives

In an overview of donor approaches to supporting smallholder value chains,[7] summarizes incentives as provision of finance; he further elaborates that without access to finance; farmers are not able to invest in quality input, processing and output resources. His argument is that when value chain approaches are being thought out, they tend to focus on quality production, access to market and other demand and supply forces while in reality all this need to be lubricated with finance. This point of view has further been supported by [14] whose research on eliminating inefficiencies within the value chain noted that to support smallholder productivity, availability of credit services is core as it is through credit that smallholder farmers are liquid and able to invest in quality inputs. Reference [13] concurs that the availability of credit facilities reinforces the demand for and supply of farm inputs and advisory services, which then generate growth in production and demand for market services, he then concludes his argument by stating that from input to production smallholder farmers need access to affordable credit. A lack of financial capital has been shown in Kenya to prevent smallholders from participating in global values chains because they lack the means to achieve quality and standard produce [15].

2.2.3. Resources

Resources are defined by [3], as assets both tangible and intangible used by smallholders to aid production. Major constraints faced by smallholders are the higher relative costs of resources mainly quality production assets, smallholders

can be supported to be competitive when vertically integrated livestock food chains allow for provision of quality production assets [17].

In a study on the dairy subsector, [18] indicated that assets are vital for any smallholder farmer; however the smallholder dairy farmers rely heavily on production assets due to the fragile nature of the production output. Production assets are the natural and physical (tangible) capital, which are regarded as key to inclusion in value chains, as they assist in improving the quality production [19].

In their research on conditions that make value chains effective, [20] debated on the order of priorities to establish effective value chain and stated that it is inconceivable that any transformation of the agricultural sector could proceed without major attention being given to production assets. It thus important when designing an asset based value chain intervention to understand what assets the smallholders have access to and what will improve their production, this is reflected from the findings of [21] who noted that it is crucial to understand the ways in which existing assets can being employed in value chains as well as the ability to substitute capitals and employ value chain strategies that compensate for the inadequacies of some asset profiles.

2.3. Smallholder Performance

It is important to note that performance is a measure of output especially in the agriculture and agribusiness arena, it is thus crucial that smallholder farmers produce the highest quality output [15].

Key performance indicators to help farmers diagnose the strengths and weaknesses in their dairy enterprises are the levels of growth and quality of output; growth indicators include increased herd, quantity produced and revenue earned as dairy is the end product the quality of milk is a critical performance indicator [2].

2.4. Data Collection

The population of study was the 70 smallholder dairy farmers linked to entrepreneurial value chain through the USAID program. A semi-structured questionnaire was the main instrument in the study. Closed questions, a few open ended questions and five-part Likert Scales' were applied to measure the various indicators to be investigated. Purposive random sampling was used to select the sample size of 50 smallholder dairy farmers based in Eldoret.

3. Results and Discussions

3.1. Summary of Findings

Below is a summary of findings:

3.1.1. Training

On whether the respondents had any formal training since joining the value chain, the study found out that majority of the respondents indicated to have attended a formal training as shown by 65% and only 35% of the respondents indicated not to have attended any formal training since joining the dairy value chain program. This is an indication that the dairy value chain provides training to its members but the session's needs to be designed in such a way that allows new members to undergo training as soon as they join the project.

This study established that of the 90% smallholders trained, 51% indicated that the training served as a knowledge portal, while 49% indicated that training served as a skill portal.

On the extent to which this training has provided assistance to the respondent's dairy farming practices, the study found out that 45% of the respondents indicated had assisted to a very great extent, 29% indicated to a greater extent, 18% indicated to a moderate extent, 6% indicated to a little extent and only 2% indicated to a low extent. This shows that training provided assistance to the respondents in the dairy farming to a very greater extent; this is demonstrated in table 3.1 below.

Table 3.1. *Impact of training on dairy farming*

Training assistance	Frequency	Percentage
Very Great Extent	22	45
Great Extent	14	29
Moderate Extent	9	18
Little Extent	3	6
Not At All	1	2
Total	**49**	**100**

The regression analysis attests to the importance of training as the leading entrepreneurial driver within the value chain. The training curricula covered effective dairy production, animal husbandry, pest control, zero grazing methodology and effective use of animal waste. 45% of the respondents indicated that this training to a great extent led to an increase in their performance.

This confirms the findings of [11], who while investigating the integrated development of value chains noted that training should not only focus on the introduction of new skills, but also strengthen and harness knowledge in order to strengthen the production capacity of smallholder farmers.

The study further established that demo land training had the most impact on the farmers training methodologies and this was represented by a 57% response rate, [22] in their paper on training for rural development identified on the farm training and demo farm training as the most effective training models for smallholder farmers as it promotes intensive sharing of knowledge and skill. Table 3.2 below summarizes the above.

Table 3.2. *Preferred model of training*

Model Of Training	Frequency	Percentage
Personal farm training	5	10
Demo land training	28	57
Open day training	16	33
Total	49	100

3.1.2. Production Resources

On whether inadequate resources has been a major challenge in the dairy farming business, the study found out that majority of the respondents were of the opinion that

inadequate resources been a major challenge in the dairy farming business as shown by 92% and only 8% indicated that inadequate resources is never a challenge in dairy farming. The reasons attached to this is that to purchase the exotic breeds a farmer requires a lot of money and maintaining the new breed is also another huge predicaments. These new breeds even require to be insured and veterinary services are a prerequisite for the health of these animals.

On the extent to which access to resources has improved their farming, the farmers response is as table 3.3 below

Table 3.3. *Influence of access to resources of performance*

***Influ*ence**	**Frequency**	**Percentage**
Very great extent	24	49
Great extent	17	35
Moderate extent	7	14
Little extent	1	2
Not at all	0	0
Total	**49**	**100**

On the extent to which access to resources influenced the dairy farming business, the study found out that majority of the respondents were opinion that resources influences dairy farming business to a very great extent as shown by 49%, 35% indicated to a greater extent, 14% indicated to a moderate extent, 2% indicated to a little extent while as non-indicated not at all.

The study further revealed that all respondents had been supplied with animal feeds and veterinary services at a subsidized price, the availability of timely and quality production resources increased the quantity of milk which in return increased the revenue collected at the end of the month.

On resources which the respondents felt were important on improving the dairy farming, the farmers requested that the value chain interventions should also come up with agro vets who would solely serve these farmers, train them on how to use dairy medication and other animal feeds supplements. The smallholders requested that USAID assist them by forming linkage with breeders as lack of this link was affecting their performance negatively, as poor quality breads result in poor quality and quantity of milk, this findings confirm those of [11], who indicated that production assets are the natural and physical (tangible) assets which are regarded as key to inclusion in value chains, as they assist in improving the quality production.

3.1.3. Incentives

On whether the respondents were a member of any financial institution before joining the value chain project, the study found out that 90% of the smallholders were only in the small informal financial groups, 10% where in both informal groups and formal financial institutions. Since joining the value chain 31% of the farmers had been absorbed into formal banking while 69% of the respondents could still not access loans from formal financial institutions. It was noted that of the 31% respondents who could receive loans from formal institutions, the sums disbursed were low and 95% of the respondents would turn to informal savings and loan groups to top up the amount.

The respondents felt it would be encouraging if the dairy chain interventions would include interest free loans and also work in collaboration with organizations that carry out dairy cattle breeding so that they can buy these exotic breed at affordable prices.

The study also revealed that irrespective of where the finance was accessed it had impacted greatly on smallholder performance, the findings are summarized in table 3.4. From the study access to finance had helped the respondents increase their milk quantity as shown by 35%, 31% indicated that access to finance had helped them increase their revenue received at the end of the month, 24% indicated that finance had enabled them increase their herd and only 10% indicated that the funds had helped them increase the milk quality. This is a clear indication that funds play a significant role in catapulting the dairy farming and inadequate funds has played a big role in poor performance in the dairy industry. According to [13], the availability of credit facilities reinforces the demand for and supply of farm inputs and advisory services, which then generate growth in production and demand for market services he then concludes his argument by stating that from input to production smallholder farmers need access for the purchase of inputs and for cash flow financing, small farmers need access to affordable credit

Table 3.4. *Influence of access to finance on performance*

Funds accessed	**Frequency**	**Percentage**
Increased herd	12	24
Increased milk quantity	17	35
Increased revenue	15	31
Increased milk quality	5	10
Total	**49**	**100**

3.2. Smallholder Performance

To gauge the level of growth since joining the entrepreneurial value chain, the study looked at growth in relation to quantity of milk produced and increase in herd.

3.2.1. Quantity of Milk and Increase in Herd

Table 3.5 outlines the findings of increased performance based on quantity of milk and increase in herd.

Table 3.5. *Performance measured by increase in quantity of milk produced and increase in herd.*

Quantity of milk	**Frequency**	**Percentage**
Below 5 liters	11	22
6-10 liters	18	37
11- 20 liters	10	20
21-35 liters	6	12
Above 36 liters	4	8
Total	**49**	**100**
Increase in herd	**Frequency**	**Percentage**
1-3 cows	41	84
4-6 cows	4	8
7-10 cows	3	6
Above 10 cows	1	2
Total	**49**	**100**

The study established that 22% of the respondents

increased their weekly production by below 5 liters while 37% of the respondents indicated that there was an increment of 6 to 10 liters post their introduction to the value chain This is reflected in table 3.5. A clear indication that their performance in relation to quantity of milk produced increased.

In relation to increase in herd, the study established that 84% of the respondents had increased their herd by between 1 and 3 cows since joining the value chain and 2% of the respondents indicated that they had grown their herd by more than 10 cows. These findings are reflected in table 3.5.

3.2.2. Increase in Revenue

The study looked at increased in farm gate prices of the smallholders' milk as in indicator for performance. To measure the growth of the respondents based on increased revenue the study approached this question in relation to increase of revue per liter of milk sold. 88% of the respondents indicated that they were able to fetch between one Kenya shilling and Three Kenya shillings since joining the entrepreneurial value chain. As demonstrated in table 4.13, none of the respondents fetched more than seven Kenyan shillings per liter. These findings indicate that farmers are able to fetch more revenue for their increased production and may suggest the need for value addition to increase the revenue past the Kes.7 mark. When asked whether their milk quality increased, 92% of the respondents indicated that the quality did not improve, 8% indicated that improved quality had been the reason they increased the revenue. The inability to appreciate that quality of milk improved was more due to lack of respondents understanding that quality of milk improves as they believe that the only aspect that can improve in milk is the quantity. These findings are reflected in table 3.6.

Table 3.6. *Performance measured by increase in revenue*

Revenue per liter (Kes)	Frequency	Percentage
1-3	43	88
4-6	6	12
7-10	0	0
10	0	0
Total	**49**	**100**

3.3. Regression Analysis

This section presents regression analysis of the influence of entrepreneurial driving opportunities provided within a value chain, namely; training, production resources and incentives on the performance of smallholders within the dairy value chain.

In this study, R squared was used to check how well the model fitted the data. R squared is the proportion of variation in the dependent variable explained by the regression model.

Table 3.7. *Model summary*

Mo-del	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867[a]	.778	.766	.07833

Level of significance 0.05

From the findings in the above table the value of adjusted R squared (co-efficient of determination) was 0.766 an indication that there was variation of 76.6% on the growth of small holder's dairy farmers within a value chain is due to introduction of training, access to production resources and incentives at 95% confidence interval . This shows that 76.6% changes in growth of small holder's dairy farmers within a value chain could be accounted for by changes in training, production resources and incentives. The study also established that there is strong positive relationship between the variables as shown by correlation coefficient of 0.867.

Table 3.8. *ANOVA*

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.956	2	0.478	3 .619	.050[b]
	Residual	6.072	46	0.132		
	Total	7.028	48			

Level of significance 0.05

From the ANOVA statistics in table above, the processed data, which is the population parameters, had a significance level of 5% which shows that the data is ideal for making a conclusion on the population's parameter as the value of significance (p-value) is less than 5%.

The established regression equation was:

Y = 0.454 +0.560 X1 + 0.295 X2 + 0.011 X3 .From the above regression equation it was revealed that holding training, production resources and incentives to a constant zero, growth of small holder's dairy farmers within a value chain would be at 0.454 , a unit increase in training would lead to an increase in growth of small holder's dairy farmers within a value chain by a factors of 0.560, unit increase in production resources would lead to increase in growth of small holder's dairy farmers within a value chain by factors of 0.295, a unit increase in incentives would lead to increase in growth of small holder's dairy farmers within a value chain by a factor of 0.011.

There is a positive relationship between growth of small holder's dairy farmers within a value chain and training, production resources and incentives. All the variables were found to be significance since their p-value were less than 0.05 indicating that the entire variables were statistically significant.

4. Conclusion

The study concluded as follows

4.1. Training

The study concluded that smallholders had been assisted to a greater extent by the training offered within the diary value chain. As to whether the training impacted more on knowledge or skill of smallholders, the study revealed that it served both, the respondents reflected a 2% difference with more leaning towards knowledge but the margin it narrow making skill also relevant.

4.2. Production Resources

The study also concluded that production resources have an influence on smallholder performance. Smallholders consider high quality breed a major production resource in their business and indicated that the value chain intervention should consider linkage to breeders as a trigger to improved performance. It is however important to note that 49% of the respondents attribute improved performance to availability of production resources especially access to quality subsidized animal feeds and veterinary services.

4.3. Incentives

The study finally concludes that incentives do have a significant role in catapulting the dairy farming and inadequate funds and financing had been a challenge to dairy smallholders. The study concludes that the smallholder who had not qualified for formal borrowing resorted to table banking and both groups attribute increased quantity of milk and improved farm gate prices to access to finance as these funds have seen them improve quantity of milk and farm gate prices.

5. Recommendations

5.1. Recommendations for Further Research

This study recommends that further research be carried out on the influence of an entrepreneurial value chain approach on other actors within the dairy value chain. It will be important to establish whether the three entrepreneurial drivers have an influence on other actors higher up the value chain in a bid to grow the whole chain. There is also need for further research to determine whether the entrepreneurial value chain approach would increase performance of smallholders in other value chains within the agricultural sector.

5.2. Recommendation for Adoption of Entrepreneurial Value Chain Approach

Through the findings of the study, there is an opportunity for the R.o.K to grow smallholders, especially within the dairy value chain, by intentionally introducing the entrepreneurial value chain approach in its agriculture and agribusiness programs. This intervention will not only improve smallholder performance, grow the smallholder microenterprises but also have an impact in to realizing attainment of Vision 2030's economic pillar.

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