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Nexus between Technology Adoption and the Development of Dairy Cooperatives in Kiambu County, Kenya

Mugwe Peter Githinji[1], David Nzioka Mutisya[2], Alex Nabiswa[3]

[1]Strathmore University
[2]Jomo Kenyatta University of Agriculture &Technology
[3] University of Nairobi Kenya

ABSTRACT

Cooperatives societies are part and parcel of an increasing number of people in formal and informal employment the world over. The study sought to examine the effect of the adoption of technology on the development of dairy cooperatives. Grounded on the Social Capital Theory, this study adopted the descriptive research design. In this study, the target population was 59,635 registered Dairy Cooperative members while the sample size was 398 respondents who were picked via stratified random sampling. Data collection involved questionnaires that contained 5-point scale Likert-type statements. Descriptive and inferential statistics were carried out. In this case, tests such as central tendency (mean), frequencies, percentages, and standard deviation in addition to Pearson and regression analysis were utilized. The findings show that the factor under investigation has a significant influence on the development of dairy cooperatives. This is evidenced by a positive and statistically significant relationship between technology adoption and the development of dairy cooperatives ($r=.646$, $p<0.001$). These findings are corroborated by results from multivariate regression analysis that shows that the technology adoption statistically significantly predicted the DV, $F=68.052$, $p<0.05$. This would go on to enhance their development. The study recommends that there is a need for dairy cooperatives to put in place mechanisms for buttressing access to technology. Further, the study recommends the need for policies to be in place to strengthen research on the challenges facing dairy cooperatives development. Policies should also be put in place to create a favorable environment for technology adoption.

Keywords: Dairy Cooperatives, Regression analysis, Technology Adoption.

I. INTRODUCTION

A cooperative is formally defined as 'an autonomous association of people united voluntarily to meet their common social, economic, and cultural needs and aspirations through a mutually owned and democratically-controlled enterprise.' The International Labor Organization (ILO) (2002) and United Nations (2009), posit that co-operatives in developing countries can play a very integral role in poverty eradication and economic stimulation of the developing countries. The ILO and the International Co-operative Alliance (ICA), both see the potential of cooperatives to contribute to the Sustainable Development Goals (ILO and ICA, 2013). This is with the support and the spirit of the Cooperative values among them; self-help, democracy, equality, equity, and solidarity supported by the Cooperative principles and mode of governance (voluntary and open membership, democratic member control, member economic participation, autonomy and independence, education, training and information, co-operation among cooperatives, concern for the community), co-operatives possess the capacity of promoting economically and socially inclusive development.

The current co-operative movement was founded in 1844 in Rochdale village, Manchester in England as posited by Pollet (2013). The old countryside credit union was introduced in 1864 by Raiffeisen in German to cover the needs of those in marginal areas in the former communist nation. The rural communities were deemed un-bankable due to limited cash flows and the capacity of human resources (WOCCU, 2008). Farmers in Africa took up cooperatives towards the end of the 1950s for cash crops like pyrethrum and coffee, tea, and sisal among other crops. Mumanyi (2014), argues that the success of the cooperative movement in Ghana has been widely simulated throughout the African Region with great success. Springing from members` savings, deposits, and ploughed back earnings are the Cooperative funds. Sharma and Patterson (2005) posit that the resultant benefits have been the improved returns, assets, food consumption and education expenditure, improved housing and reduced health expenditures which were enjoyed by the Cooperative members compared to non-members. On the flipside Problems to do with poor management, embezzlement of funds, and access to capital for development, government policies and the rapid evolution of technology are however curtailing co-operatives in Tanzania from achieving the expected growth (Mwakajumulo, 2011).

The Kenyan co-operative movement is the strongest in Africa in terms of financial liquidity and membership, the country's savings credit and co-operative (Sacco) movement is valued at over KES 1 trillion and scooping the crown among the best in Africa. Government records show that Saccos directly employ more than 500,000 while another 1.5 million Kenyans

benefit indirectly. According to the 2015 statistical Report by the World Council of Credit Union (WOCCU), Kenya has the leading Sacco movement in Africa with over five million members (WOCCU, 2010).

From extant statistics, the Cooperative Movement in Kenya is estimated to contribute about 47% of the GDP and 34% of the national savings; the extant empirical evidence indicates further that some 63% of the Kenyan populace derive their livelihood either directly or indirectly from Cooperatives. WOCCU (2010), submit that during the year 2011, the cooperative movement reported a revenue of about Ksh.50 Billion. We can conclude from this report that the cooperatives have a great potential as an economic pillar for development of the country. The way to sustain the development of these agricultural cooperatives in Kenya is increasing over time (GoK, 2013).

A GoK, 2012 study commissioned by the Ministry of Cooperative Development and Marketing found that from a sample of 220 cooperatives only 3.63% were considered to be sustainable, 35% of cooperatives had an average sustainability score and 78% were considered unsustainable. This report scored the cooperatives based on 3 sets of criteria; the existence of a business plan (50%), the degree of representation (20%) and management (30%). The poor development sustainability of agricultural cooperatives in Kenya has been attributed to the adoption of technology among other factors (RoK, 2012; WOCCU, 2010; Birchall, 2011). It is on this premise that the researcher embarked to establish the determinants of development of Dairy cooperatives in Kenya with a keen interest in Kiambu County. Could technology adoption be a driver of development of Dairy Cooperatives in Kenya? This study sought to dive deeper and find out.

1.1 Objective of the Study

Objective of this Study is to understand the effect of technology adoption on the development of Cooperatives in Kiambu County of Kenya.

2. LITERATURE REVIEW

2.1 Theoretical Review of Literature

The synergy of each and every member of a Cooperative society is required for any developmental progress of a community or a group. Social capital is the effect of members' relations in social groups that often unknowingly result in the fulfillment of their goals together and individually. This relates also to the promotion of cooperation and unity among members of the same association leading to trust and a common bond. This theoretical framework integrates two sides: on one hand how cooperatives create internal social capital and spread it in their immediate environment, and, on the other hand, it explains how the presence of social capital promotes the creation and development of cooperatives. The theories further cover the various aspects of the social capital chief among them the type of social networking, relationship, and interaction which comprises the rules, regulations, and norms that govern social actions and common bond among members including the benefits that are derived from them (Anderson, Locker, & Nugent, 2002).

The social capital theory originates from social capital, which comprises the attitudes, relationships, institutions, and values that dictate interactions among people and contribute to economic and social development. Basargekar (2009) posits social capital as "the abilities of people to work together towards resolving community or social issue and promote equitable access to benefits of development". Glaeser, Laibson, and Sacerdote (2002) suggest that "social capital can be considered as a tool of economic development among people, which also affects their environment and community." This can either be positively or negatively based on their collective action for the mutual benefit of a group or a community. He also argues that individuals do not generate social capital and thus are not the primary unit of analysis in the use of social capital theory to measure an occurrence.

Basargeker (2010) reckons that the theory focuses also on collective responsibility thus enhancing better participation by members in a society or a community. The theory surmises that when people act or function in a group like in a cooperative society, there is a trickle-down effect on the economic and social development of the group, individuals in the group, and the community. This development can either be financial condition or physical progress such as material acquisition. This is important because economic development does not take place without expansion in physical material achievement and financial possessions.

Glaeser et al. (2002) opine that the theory recognizes a healthy social and civil environment, which should help the social group to act and meet their personal, and group interest without which economic development capabilities will not be accomplished. The attention of this theory is to use social networks, associations, and relationships for the social and economic development of individuals, the group, and the community. The application of the social capital theory to the role of cooperative societies in development is to evaluate the contribution of the cooperatives to members' standard of living which examines household income, resources, business profitability and enterprise asset conditions and is expected to lead to social, financial and physical rewards.

Henry and Schimmel (2011) in conclusion suggest that cooperatives are meant to meet members' financial, economic and social needs. In the context of this current study, members' needs and interests ought to be put into consideration. The

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economic needs can be met through the financial gains while the members can derive the physical benefits from interactions, and finally, the social needs related to social benefits. The social, financial, and physical contribution of the cooperative to the members may include easy access to loans, the ability to accumulate savings, and the acquisition of physical assets like land, livestock, and houses among others. Financial benefit or capital benefit accrues in a cooperative due to improved interpersonal relations while trust and the common bond can increase efficiency and reduce the costs of transactions, thus creating financial capital which lacks in other types of institutions like banks.

2.3 Empirical Review

Technology adoption strategy has been established by many researchers to be a calculated technique to improve competitiveness and create a competitive edge within the industry. Inversely the greatest singular factor accelerating the degeneration of a firm's competitiveness is the inability to develop and integrate technology strategy and business strategy. Mitchell and Casey (2007), did a study on What Motivates Members to Participate in Cooperatives and Mutual Businesses. He discovered that technology strategy also played an important role in defining a firm's performance in technology-driven industries such as industrial automation companies as further indicated by many kinds of literature. However, most of the previous studies have generally focused on the structure-conduct-performance theory which emphasized greatly external factors (market conditions and competitors) to link strategies to firm growth.

A study by Venansius (2014) on Organizational Change found that most Cooperatives had created web pages that were easily accessible to the members and other stakeholders e.g. customers and potential members. The Cooperatives offerings are marketed here both locally and internationally on real-time basis. Transactions such as subscription payments, cooperative deposits, dividends payments, shares, bills, and generation of cooperative account statements amongst other online services have been enabled through the use of automation.

The convenience of the Automatic teller machines has enabled shareholders to access their funds anywhere at any given time. The emergency of e-money transactions like cash transfers, paying bills, buying goods, withdrawals, and deposits amongst other Cooperative mobile money services have been capacitated by the adoption of information technology. Another study carried out by Ondiek, Nyaboga, and Manyara (2003) on the challenges and opportunities facing SACCO in the current devolved system of government of Kenya found out that technology is made up of discoveries in science, product development, and improvements in process, machinery, automation, and information technology.

The Ministry of Co-operative Development and Marketing in its (2008) report posits that ICT is increasingly becoming an essential tool for efficient operations of investments and that co-operatives should be encouraged to use this technology whether ICT or for production. Through its policy document on investment, the Ministry of co-operatives notes that the number of co-operatives that are computerized is minimal while those that are partially computerized are the majority thus recommends that CODIC (Co-operative Development Information Center) be operationalized to fulfill its core mandate of developing and assisting the co-operative movement to acquire compatible computer software for their operations at a competitive price; and that to save on costs, Cooperatives should link up with private ATM service providers, e.g. Pesa link or alternatively utilize Cooperative Bank ATM service which has a countrywide network and is available for the Cooperative movement.

Finally, in a study by Welcome (2011) done in Nigeria on the quality of services and demand for health care, they found out that accurate and timely information about daily operations is essential if managers are to gauge how well the strategy execution process is proceeding; and that information systems need to cover five broad areas of customer data, operation data, employee data, supplier/partner/collaborative ally data, and the financial performance data. Thus, ICTs can provide reliable access to markets (Local, regional and International) through increased use of affordable communications (phone, email and website). Gunga (2008) posits that ICT enables the reduction in the overall operation overheads through enhanced access to timely and reliable data, and enhanced communications within the entire supply, value chain, and knowledge management that arises from the achievement of appropriate skills-sets that enhance throughput and create information about new opportunities. Literature reviewed on the adoption of technology has shown the importance of technology in organizations. However, most of the studies done do not expound on how technology especially production technology can affect the development of Dairy Cooperatives.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study used the descriptive survey design to establish factors affecting the development of Dairy Cooperatives in Kenya with reference to Dairy Cooperatives in Kiambu County. This design was used since it "determines and reports the way things are, describes data and characteristics of the population and phenomenon being studied." This study is also built on this design since as Cooper and Schindler (2003) assert, "the descriptive study is the one that is concerned with finding out who, what, when, where and how."

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3.2 Target Population

The target population for the study was 59,635 Dairy Cooperative members in Kiambu County (Kiambu County, 2018). This was partly done due to the fact that Kiambu dairy cooperatives lead in milk production in Kenya (Kenya Dairy Board, 2018). The sample population was 398 members. The targeted population of the study was collated from the various Sub-Counties.

3.3 Sampling Design and Procedures

Using stratified sampling techniques, this study sampled 398 persons from the target population of 59,635 using the simplified sampling formula stipulated by Taro Yamane (Yamane, 1967) at 0.05 level of precision. As a result, 398 respondents were sampled.

Questionnaires which contained open and closed-ended questions and also the Likert-scale type of questions were administered by the interviewer to collect primary data on the factors affecting the development of Dairy Cooperatives in Kenya.

3.4 Data Analysis

The researcher used Quantitative and Qualitative data in this research study. As such, quantitative analysis was done using the descriptive statistics aided by the use of SPSS (Data analysis application) and Qualitative data analysis involved the explanation of information obtained via discussions and explanations of the study findings. In this case, tests such as central tendency (mean), frequencies, percentages and standard deviation were carried out. Correlation and regression analysis were used. The following regression model was applied in the analysis;

$$Y=\beta O +\beta 1\ X1+ \beta 2X2 + \varepsilon$$

Where;

Y = Development of Dairy Cooperatives (Dependent Variable)
β0 = Constant Term
β1, β2 = Beta coefficients
X1 = Adoption of technology
X2 = Financial access
ε = Error Term

4. RESEARCH FINDINGS AND DISCUSSION

4.1 Response Rate

In the study, 265 of the 398 targeted respondents took part. This results in a response rate of 80 percent, which was deemed adequate to represent the study. However, non-response was due to operational difficulties, time and cost constraints, and respondents' lack of cooperation. Table 1 summarizes the response rate.

Table 1 Response Rate

Sampled	Responded	Response Rate
331	265	80%

4.1 Technology Adoption

The respondents were presented with selected statements on the influence of technology adoption on the development of dairy cooperatives in Kiambu County. They were requested to specify their level of agreement with each statement on a 5-point scale as follows: 1=Strongly Disagree; 2=Disagree; 3=Not Sure; 4=Agree; 5=Strongly Agree. The findings were presented in Table 2.

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Table 2 Technology Adoption

	1	2	3	4	5	Mean
Statement	**%**	**%**	**%**	**%**	**%**	
a) Has the Cooperative adopted technology in its processes	6.3	6.9	6.9	53.3	26.6	4
b) Has the adopted technology improved service delivery in the Dairy Cooperative	3.9	6.6	4.2	51.8	33.5	4
c) Has the adoption of technology given the Dairy cooperative a competitive edge in the industry	3.6	5.7	6.6	50.6	33.5	4
d) Has technology adoption spurred development of the dairy cooperative	3.6	3.3	8.7	46.1	38.3	4
e) Does technology adoption improve the communication with the Dairy Cooperative stakeholders	0.0	0.3	0.3	36.8	62.6	5
N=265						

The respondents agreed to four of the statements (weighed means of 4) and strongly agreed with one statement (Weighted mean of 5). In this regard, above half (53.3%) of the respondents were in agreement that the cooperative adopted technology in its processes. Another 51.8% agreed that the adopted technology had improved service delivery in the dairy Cooperative. This conforms to the Ministry of Co-operative Development and marketing findings in its (2008) report posits that ICT was an essential tool for efficient operations of investments and that co-operatives should be encouraged to use this technology.

Also, more than half (50.6%) agreed that the adoption of technology had given the dairy cooperative an economical advantage in the industry. This could enhance the development of the dairy cooperatives as posited by Mitchell and Casey (2007) who posits that one of the factors accelerating the waning of a firm's attractiveness is the inability to develop and assimilate technology strategy and business strategy. Close to half (46.1%) went on to agree that technology adoption spurred the development of the dairy cooperative which agrees with Venansius (2014). Lastly, most of the respondents (62.6%) strongly approved that technology adoption value-added the communication with the dairy Cooperative Stakeholders. This agrees with Gunga (2008) who posits that ICT plays a pivotal role in enhancing the communication processes of organizations. Thus it is apparent that technology adoption plays a crucial part in the development of dairy cooperatives.

4.4 Development of Dairy Cooperatives

The respondents were asked to indicate their levels of agreement with selected statements about the development of dairy cooperatives. The findings were presented in Table 3.

Table 3 Development of Dairy Cooperatives

	1	2	3	4	5	Mean
Statement	**%**	**%**	**%**	**%**	**%**	
a) There is prompt adoption of technology in our firm to make us competitive	2.7	3.3	14.1	29.6	50.3	4
b) We stick to our budgets to enhance the efficiency of our firm	5.4	11.2	26.3	23.4	33.7	4
c) We ensure the satisfaction of our members which enhances the performance of our dairy cooperative	6.6	16.2	11.4	30.2	35.6	4
d) Our dairy cooperative has been operating profitably	5.4	23.6	3.8	16.5	50.7	4

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e)	We do thorough market research to enhance the productivity of our Sacco	6.7	21.7	1.9	13.5	56.2	4
f)	We often face constraints in the management of our dairy cooperative	1.4	0.3	2.7	32.8	62.8	5
g)	There are effects of technology apathy in the development of the Dairy Cooperative	1.5	0.3	6.3	31.2	60.7	4
h)	The performance of our dairy is affected by high costs of computer accessories	0.6	0.9	20.1	29.4	49	4
N=265							

In terms of the development of dairy cooperatives, mixed results were obtained, with means ranging from 4 (agree) to 5 (strongly agree). To begin, the majority of respondents (50.7 percent) strongly agreed that the dairy cooperative were operating profitably. This is consistent with Muchiri (2012), who state that well organizationed cooperatives are profitable. The majority of respondents (62.8 percent) also strongly agreed that the Dairy Cooperative faced management-related challenges when implementing development projects. Furthermore, 60.7 percent strongly agreed that technology apathy sometimes hampered the development of Dairy Cooperatives. This backs up the findings of Develtere et al. (2008), who claim that managerial issues hampered the success of dairy cooperatives.

Almost half of the respondents (50.3 percent) agreed that their technology adoption was usually timely in order to remain competitive. Another nearly one-third (35.6 percent) agreed that their stakeholders/members were usually satisfied with the development projects they undertook. As suggested by Francesconi and Heerink (2010), this could lead to additional support and success for the projects. Another nearly half (49.0 percent) agreed that the Dairy Cooperative's development was hampered by the high costs of technology hardware and software.

When asked if their development projects were typically completed within the estimated budget costs, the majority of respondents (33.7%) said they were unsure. Because timeliness was a key indicator of project success, this was an indication of success in project implementation (Hamisu, 2010). Finally, 56.2 percent of respondents strongly agreed that there was evidence that their development projects were sustainable because they were based on quality market research. This demonstrates that projects were frequently undertaken with prior research into their suitability.

4.5 Correlation Analysis

Pearson correlation shows that there was a statistically significant relationship between technology adoption ($r=.646$, $p<0.001$). These findings show that technology adoption showed the strongest relationship with the development of dairy cooperatives.

Table 4 Pearson Correlation

		Technology Adoption
	Sig. (2-tailed)	.000
Development of Dairy Cooperatives	Pearson Correlation	.646**
	Sig. (2-tailed)	.000
**. Correlation is significant at the 0.01 level (2-tailed).		

N=265

4.6 Multivariate Regression Analysis

Multiple Regression analysis was carried out to find out the level to which the dependent variable (DV) could be explained by the independent variables (DVs).

4.6.1 Model Summary

Table 5 shows the model summary. In the study model, the correlation coefficients R for regression between the IVs and DV had a value of 0.673. This shows that 67.3% of the variability in the regression model can be explained by the data used in this study. Further, the coefficient of determination R2 in the model was 0.453. This implies that 45.3% of the variance in the development of dairy cooperatives can be explained by the independent variables.

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Table 5 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.673[a]	.453	.446	1.00889
a. Predictors: (Constant), Technology Adoption				

4.6.2 Analysis of Variance

As shown in Table 6, the IVs statistically significantly predict the DV, F = 68.052, p <0.05. This shows that the regression model was a good fit for the data.

Table 6 Analysis of Variance

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	277.068	4	69.267	68.052	.000[a]
	Residual	334.875	329	1.018		
	Total	611.943	333			
a. Predictors: (Constant), Technology Adoption						
b. Dependent Variable: Development of Dairy Cooperatives						

4.6.3 Regression Coefficients

The study went on to fit the regression coefficients obtained into the study regression model. Under the section on coefficients, a significant t-test value ($p<0.05$) was obtained for technology adoption ($t=10.670$, $\beta=0.541$). This shows that all the variables can be fitted into the regression model adopted by this study.

The model was:

$Y=\beta_O +\beta_1 X_1+ \varepsilon$

Where:

Y = Development of Dairy Cooperatives (Dependent Variable)
β0 = Constant Term
β1, β2 = Beta coefficients
X1 = Adoption of technology
ε = Error Term

In this regard, the fitted model using the unstandardized coefficients was:

Development of Dairy Cooperatives = 0.745 + (0.540*Technology Adoption) + 0.273.

The significant Standardized Beta Coefficients show that enhancing Technology Adoption by 1 unit would lead to the Development of Dairy Cooperatives by 0.541 units.

Table 7 Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.745	0.273		2.732	0.007
	Technology Adoption	0.54	0.051	0.541	10.67	0.000
a. Dependent Variable: Development of Dairy Cooperatives						

Source: Author (2021)

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5. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study concludes that technological adoption was critical in the development of cooperative societies in Kenya. This is supported by a positive and statistically significant relationship between technology adoption and dairy cooperative development (r=.646, p0.001). According to these findings, technology adoption has the strongest relationship with the development of dairy cooperatives. These findings are supported by multivariate regression analysis, which shows that technology adoption statistically significantly predicts DV (F=68.052, p 0.05). This would further their development.

5.2 Recommendations

Anchored on the theoretical literature, empirical assessment, and the research outcomes, the study recommends that there is a need for dairy cooperatives to have robust management teams staffed with highly competent and experienced managers. Dairy cooperatives should also put in place mechanisms for buttressing the access to technology. Further, the study recommends the need for policies to be in place to strengthen research on the challenges facing dairy cooperatives development. Policies should also be put in place to create a favorable environment for technology adoption.

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