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## **Influence of Farmers' Participation on Dairy Marketing Risk Strategy in Farmer Co-Operatives in Kenya**

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### **Abstract**

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*The objective of the study was to establish the influence of farmers' participation on dairy marketing risk strategy in farmers co-operatives in Kenya. Specific objectives were to determine the influence of farmer awareness, farmer cultural practices and dairy technology utilization on dairy marketing risk strategy in the farmers' co-operatives in Kenya. Descriptive research design targeting all management employees in the 17 Dairy Farmer Co-operative societies in Kiambu County was adopted. Multiple linear regression analysis was used to determine the influence of farmers' participation on dairy marketing risk strategy. Results were presented using tables. Farmer awareness ( $\beta=0.430$ ;  $P\text{-value}=0.000<0.05$ ), cultural practices ( $\beta=0.338$ ;  $P\text{-value}=0.000<0.05$ ) and dairy technology utilization ( $\beta=0.456$ ;  $P\text{-value}=0.000<0.05$ ) had positive significant influence on dairy marketing risk strategy. The study concludes that farmer awareness, cultural practices and dairy technology utilization positively influences dairy marketing risk strategy and suggests that dairy co-operatives should develop farming systems, research and extension models to identify, assess and mitigate marketing risk.*

**Key Words:** Agricultural Risk, Co-operatives, Cultural Practices, Farmer Awareness, Farmer Participation, Dairy technology Utilization.

### **Introduction**

Risk, especially production risk, is pervasive and very complex (Aditto, et al., 2012). This is because there are numerous uncertainties that cause variations in weather, yields, prices, government policies and global markets, which affect farming income in an adverse way. Farmers' participation comes in handy as an important component in agricultural market risk strategy formulation, implementation and reporting (Langerod & Dinpanah, 2017). Farmers risk perception is essential in understanding their risk behavior because risk management strategies are hedged on these attitudes. In their assessment, Duong et al. (2019) observed that farmers' participation in animal production, pests and diseases monitoring and prevention significantly contributed to the success of the programs. The need for risk management is dire because unmanaged risks have the potential to significantly impede long-term economic growth and attempts to reduce poverty, as well as having major effects on the agriculture sector (Rahimi & Fallah, 2015). Globally, the essence of farmers' participation in risk management has been underscored in numerous studies. For instance, in a study by Afful and MafsiKANENG (2018) in 2015 on farmers' participation in the Comprehensive Agricultural Support Program

(CASP) in the Tshwane Metropolitan Municipality in South Africa alluded that participation of farmers is crucial for rural areas to have sustainable agriculture. In Iran, Neisi et al. (2020) concluded that farmers should have access to a range of tools and methods and be required to make their own risk management decisions as part of agricultural risk management plans. A study on cattle farmers' participation in risk in Tigray Ethiopia, Bishu et al. (2018) provided substantial data showing that farmers' use of various risk management techniques decreased losses due to cattle morbidity and death. In yet another study in Uganda, Benin et al. (2011) discovered a positive correlation between program participation and duration of strategy implementation.

Agricultural Risk Management (ARM) strategy formulation has evolved from the dilemmas experienced in the past (Anantha et al, 2021). The main objectives of the ARM strategy are to anticipate and manage potential risks for the agricultural sector and to develop advance plans for solutions to limit the negative effects by addressing mitigation measures and adopting available control tools (Ifft, et al., 2015). By improving the capacity of stakeholders along agricultural supply chains to mitigate the consequences of catastrophes and crises as well as to predict, and recover from them in a timely, efficient, and sustainable manner, ARM helps create resilience at the household, community, and national levels (Tedesco, 2018). Often farmers make decisions regarding crop farm inputs, crop yield and animal yield (Sibiko & Qaim, 2020). However, these decisions are engulfed by uncertainties relating to variations in weather conditions, emergence of diseases, pests, fluctuations in market price, sudden changes in interest rates and changes in government policies (Bishu et al., 2018).

The dairy industry in Kenya produces 3.43 billion liters of milk annually, which accounts for around 8% of the country's GDP. Kenya produces 3% of the 18% of milk produced globally by Sub-Saharan Africa (Okello & Luttah, 2022). An estimated 4.3 million dairy cattle are raised in extensive, semi-intensive, and intense systems of production. Despite the fact that smallholder dairy farmers in Kenya account for 80% of all dairy producers and generate 56% of the nation's milk, they have resource constraints that prevent them from being able to identify, evaluate, mitigate, and adopt new practices (Kariuki, 2021). From the highlighted studies it is evident that most of the studies were conducted in other countries and there is less information on Kenya dairy sector with regard to farmer participation and dairy marketing risk strategy formulation.

## **Literature Review**

### ***Farmer Awareness and Dairy Marketing Risk Strategy***

Regarding the influence of farmer awareness on dairy marketing risk strategy, Scholars such as Kumar et al., (2011) conducted a study on farmers' opinion and awareness regarding crop insurance as a tool for risk management established that only half of farmers were aware of crop insurance programs or products. Similarly, Velandia, et al. (2019) posted that majority of farmers are aware of the government's risk reduction initiatives. Moreover, Soni and Trivedi (2018) alluded that it is necessary to spread knowledge about insurance plans among farmers.

Besides, Sujianto et al. (2022) revealed a considerably different perception of production, quality, health and safety, market price, environmental concern, and certification between Organic Rice Farming (ORF) and Conventional Rice Farming (CRF) farmers. A study was conducted by Rahayu et al. (2021) to evaluate farmers' decisions on risk management strategies

for corn farming in Sigi District, Indonesia indicated that majority of corn farmers do not have a defined risk management strategy. Another study by Soni and Trivedi (2018) to establish the current crop insurance landscape in India indicated that farmers knew more about crop insurance than they did about cattle insurance. Sujianto et., al (2022) found out that lack of access to information is the main barrier to successfully managing agricultural risks with farmers. According to Duong et al. (2019), in order to raise farmers' awareness, communication with them can be done through kisan sabha, the media, and education.

A study was conducted in order to evaluate farmers' decisions on risk management strategies for corn farming by Rahayu et al. 2021. Both primary and secondary data were used. Primary data were acquired from 75 farmers, and secondary data came from the Central Bureau of Statistics in Central Sulawesi and other relevant stakeholders. From August 2019 to July 2020, the study used a basic random sampling with a purposeful location in the Sigi District, including the three sub-districts of Dolo, Dolo Barat, and Gumbasa. These results support the claims made by Sundar and Ramakrishnan (2013) that characteristics such as farmer awareness, education, farm size, participation in farmer groups, alternative commodities, and risk-taking inclination have a substantial impact on the decision about risk management techniques.

### ***Farmer Cultural Practices and Dairy Marketing Risk Strategy***

In relation to farmers' cultural practices, a study undertaken by Sulewski et al. (2020) in 600 Polish farms participating in the Farm Accountancy Data Network revealed that farmers are often risk averse. Asravor (2019) found a high correlation between farmers' attitudes toward risk and the choices they make when faced with risk. Further, Flaten et al. (2016) concluded farmers diversify their income streams as a result of their perception of various types of risk in order to maintain their standard of living in the event that agriculture is unsuccessful. In 2018, Eitzinger, Binder and Meyer maintained that social groups, off-farm income, the proportion of wage earners to total household members, farm size, land ownership status, and government support all have an impact on the viability of rice farmers.

Sulawesi et al. (2020) established that the goal of measuring farmers' attitudes toward risk and identifying farm and farmer characteristics in relation to level of risk aversion. With 600 Polish farms participating in the Farm Accountancy Data Network, a representative sample, the assessment of farmers' preferences for risk was based on hypothetical games (FADN). Interviews were used to get the data. According to the research, Polish farmers are often rather risk averse. Farmers' perceptions of risk and how they rate themselves as decision-makers under risk are closely related. These findings support Asravor's (2019) research, which found a high correlation between farmers' attitudes toward risk and the choices they make when faced with risk. According to Bhuyan (2007), farmers' possible responses to a major decline in income and the use of specific risk management measures by farmers are both influenced by their level of risk aversion. However, the study was conducted in Poland and therefore its result cannot be generalized in the current jurisdiction.

Based on a sample of fruit and vegetable producers' cooperatives in the Mid-Atlantic region of the United States, Bhuyan (2007) conducted a study to ascertain the impact of human variables on farmers' attitudes. The findings of the study indicated that beliefs and knowledge of members of a cooperative may determine their attitudes and behavior. These findings are in line with Sulewski and Gajewska (2014) claims that people's attitudes and behavior are

influenced by their ideas and knowledge. A thorough grasp of members' is required due to the gradual fall in cooperative membership and cooperative numbers in the US and other nations (Hayran, 2019). The research was however limited to United States and thus its findings cannot be generalized in Kenya.

### ***Farmer Dairy Technology Utilization and Dairy Marketing Risk Strategy***

Regarding farmer dairy technology utilization, Mwololo and Ajambo (2019) conducted a study to determine whether smallholder farmers use the choice of agricultural technologies as a risk management strategy and found that adoption of enhanced indigenous chicken and fortified beans decreased when marketing risks rose due to restricted access to markets. Besides, while tubular nets show promise over the traditional peg and rope technology to improve "cottonii" seaweed productivity and local ecosystems, they are more suited to deeper water and thus require either swimming or boat handling skills that women do not have, according to a study on the introduction of improved seaweed farming technology for women's empowerment, livelihoods, and environmental protection in Zanzibar by Brugere et al. (2019).

In an effort to comprehend the farming practices and cattle production in Tanah Laut, South Kalimantan, Rohaeni, et al. (2019) concluded that there is a positive correlation between technical and extension support, inconsistent development programs, and the growth of the cattle population. Consequently, it was concluded that understanding of farming systems and dairy technology significantly contributes toward better development in farming and increased beef production and supply. In addition, Kumar et al. (2021) analyzed the literature to build a theoretical framework for virtual reality (VR) technology adoption in preserving quality in agriculture production while considering future perspectives on progressive farming in relation to use of VR technology. Partial

### **Methodology**

The study used a descriptive research design. A descriptive survey, according to Marshall and Rossman (2014), focuses on the process of gathering information in order to test hypotheses and respond to inquiries about the current state of the phenomenon being studied. The targeted population in this study was Dairy Farmers Co-operative Societies in Kiambu County. Out of a population of 21 Dairies, the study targeted management employees of 17 Dairy Farmers Co-operative Societies in Kiambu County, Extension Officers and Farmers representatives. Four managers in each Co-operative Society being the General Manager, Finance Manager, Production Manager and Marketing Manager, Extension officers and farmers' representatives were selected forming a sample of 138 respondents.

### **Results**

#### ***Regression Analysis***

Multiple linear regression analysis was carried out to determine the influence of farmer awareness, farmer cultural practices and farmer dairy technology utilization on dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya. The predictive power of the model was estimated using R-squared ( $R^2$ ). The fitness of the model was determined on the basis of F-statistic and its significance while the significance of the variables in predicting dairy marketing risk strategy was based on P-values at 0.05 significance level.

The results show that the adjusted R square is 0.764 implying that 76.4% of all variation in market risk strategy in the Dairy Farmers Co-operative Societies in Kenya was caused by variations in farmer awareness, farmer cultural practices and farmer technology utilization. The results also suggest that there are other factors influencing market risk strategy in the dairy farmers co-operative societies in Kenya accounting for 23.6% that were not covered in this study.

**Table 1: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.878 <sup>a</sup>	0.770	0.764	0.11416

a. Predictors: (Constant), Farmer Technology Utilization, Farmer awareness, Farmer Cultural Practices

To determine the fitness of the model, the study conducted Analysis of Variance (ANOVA). The results show that the calculated F-statistic was 111.939 which was greater than the f-critical value (2.694). Similarly, the P-value for the F-statistic was  $0.000 < 0.05$  suggesting that the model was fit in predicting the dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya.

**Table 2: Analysis of Variance**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.548	3	1.516	111.939	0.000 <sup>b</sup>
	Residual	1.381	102	0.014		
	Total	5.903	105			

a. Dependent Variable: Dairy Marketing Risk Strategy

b. Predictors: (Constant), Farmer Technology Utilization, Farmer Awareness, farmer cultural practices.

Student t-test was carried out to determine the significance of Farmer Awareness, farmer cultural practices and farmer technology utilization in predicting dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya.

**Table 3: Beta Coefficients of the Variables**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.692	.457		3.702	.000
	Farmer awareness	.430	.084	.346	5.119	.000
	Farmer Cultural Practices	.338	.090	.240	3.756	.000
	Farmer Technology Utilization	.456	.079	.408	5.772	.000

a. Dependent Variable: Dairy Marketing Risk Strategy

From the results in Table 3, the regression model was fitted.

$$Y = 1.692 + 0.430X_1 + 0.338X_2 + 0.456X_3 + \text{error Term}$$

From the equation, it is established that the constant was 1.692 indicating that holding farmer awareness, farmer cultural practices, farmer technology utilization constant at zero, dairy marketing risk strategy would be 1.692. The results further show that the coefficient of farmer awareness was 0.430 indicating that holding all other factors constant, a unit increase of farmer awareness would result to an increase in dairy marketing risk strategy by 0.430 units. The P-value of farmer cultural practices was  $0.000 < 0.05$ . The results thus show that farmer awareness significantly predicted dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya.

It was also established that the coefficient of farmer cultural practices was 0.338 indicating that holding all other factors constant, increasing farmer cultural practices by one unit will result to an increase in dairy marketing risk strategy by 0.338 units. The P-value of farmer cultural practices was  $0.000 < 0.05$ . The results thus show that farmer cultural practices significantly predicted dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya.

Besides results showed that farmer technology utilization had a significant and positive influence on dairy marketing risk strategy ( $\beta=0.456$ ,  $P=0.000 < 0.05$ ). This implies that a unit increase in farmer technology utilization will result to an increase in dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya by 0.456 units. Since the coefficient of farmer technology utilization was significant, it implies that farmer technology utilization had a significant influence on dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya.

## **Discussion**

The study found that lack of access to information is the major barrier to successfully managing agricultural risks with farmers. Farmers' preferred methods for managing agricultural risk include crop diversification, pest and disease surveillance, and prevention. The findings concur with those of Sundar and Ramakrishnan (2013) who found that there was little knowledge of crop insurance among farmers. Additionally, farmer awareness had a strong positive correlation with dairy marketing risk strategy. The regression analysis revealed that farmer awareness had a statistically significant and positive influence on dairy marketing risk strategy. The results relate to those of Kumar, Barah, et al. (2011) evaluated participants' perceptions of several crop insurance program components and found that only 50% of farmers were aware of crop insurance programs or products.

The study established that farmers' adoption of dairy marketing risk strategy is influenced by their respective levels of risk aversion and agricultural experience. These results support Nguyen-Thi-Lan (2021) assertions that farmers' decisions to choose off-farm diversification revenue sources are influenced by their education and farming experience. These results are consistent with the conclusions that social variables have a favorable and considerable impact on enhancing the sustainability of rice production, as claimed by Nayak and Manjunatha (2019). Besides, farmer cultural practices had a strong positive correlation with dairy marketing risk strategy. The regression analysis revealed that farmer cultural practices had a statistically significant and positive influence on market risk which supports the postulations of Sulewski et al. (2020) that Polish farmers generally exhibit a high level of risk aversion.

The study established that farming activities, awareness campaigns and training programs could improve the adoption of agricultural technologies, farmers experience uncertainties relating to technical know-how on modern farming technologies, understanding dairy technology significantly contributes toward better development in farming, farming dairy technology has assisted in coping with the unreliable weather conditions and farmers are educated about the available farming technologies. Limited access to markets hindered adoption when marketing risks rose, according to Mwololo and Ajambo's research (2019). Because they may be wealthier and generally more knowledgeable about dairy technology, older farmers are more likely to accept dairy technology utilization, lowering their overall risk aversion.

## **Conclusion**

Farmer awareness had a statistically significant influence on dairy marketing risk strategy. Further, farmer awareness had a positive influence on dairy marketing risk strategy. This implies that an increase of farmer awareness by a unit will result to increase in dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya. Also, farmer cultural practices had a positive influence on dairy marketing risk strategy. Hence, a unit increase in farmer cultural practices will result to increase in dairy marketing risk strategy in the Dairy Farmers Co-operative Societies in Kenya. Finally, farmer dairy technology utilization had a statistically significant influence on dairy marketing risk strategy. The study concludes that farmer dairy technology utilization positively influences dairy marketing risk strategy.

## **Recommendations**

The study recommends that co-operatives should identify, assess, mitigate and absorb the available tools of control for the protection of stakeholders, governments and even the livelihood of the farmers. To ensure success, the management of the farmer organizations should work together with the different stakeholders in the value chain. They should also develop farming systems research and extension to support agricultural development projects.

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