SOCIALLY RESPONSIBLE INVESTING AND THE PERFORMANCE OF CLIMATE-SMART AGRICULTURAL PROJECTS

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Abstract

This study aimed to establish how socially responsible investing promotes the performance of climate-smart agricultural projects. Wani et al. (2024), investigating the Middle East and North Africa, found environmental quality depends on economic growth. However, to realize economic development in a country where agriculture is the backbone of the economy, stakeholders need to promote the value of the agricultural products and reduce post-harvest loss through value addition. This study anchors on game theory, which opines that the economy is not fixed. Hence, agricultural stakeholders need to be innovative and progressive. A descriptive research design was employed to study two climate-smart agriculture projects, with a population of 516 small-scale farmers. The study found a relationship between socially responsible investing and the performance of climate-smart agricultural projects. However, the interaction between value addition and socially responsible investing had minimal influence. The hurdle was underlying factors such as poverty and insecurity. Consequently, it is imperative to have policies and stakeholders prioritize and promote provision of the scarce public and private goods to enhance small-scale farmers' resilience and propel them from subsistence to commercial production for value addition of surplus food.

Keywords: Climate-Smart Agriculture, Performance Measurement, Management Control, Resource Allocation, Stakeholder Engagement, Socially Responsible Investing, Value Addition

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1. INTRODUCTION

Projected population growth demands an increase in food production. However, 33.3% of the global total produced food goes to waste (Al Hinai et al., 2022). The resultant effect is the 25% of the undernourished population in sub-Saharan Africa (Beyene, 2023). Worse still, some conventional food production methods are unsustainable (Akomea-Frimpong et al., 2022; Malik & Yadav, 2020), leading to soil degradation and the destruction of carbon sinks and water towers, and, consequently, food insecurity, an underperforming economy, and poverty (Ruheni & Wambugu, 2022). There is a need to reverse the trend.

However, Kenyan small-scale farmers suffer setbacks hindering socially responsible investing. Scrupulous traders and colonialists marginalized non-settler agriculture from development (Bernards, 2022; Bjornlund et al., 2020). Unfortunately, this is a global phenomenon (Akomea-Frimpong et al., 2022). In addition, farmers lack skills (Kirimi et al., 2021). This is evident in Laikipia County where large-scale ranches reap six times better than small-scale pastoralists (Kamau et al., 2020). However, socially responsible investment in agriculture can reverse the negative trajectory (Pawlak & Kołodziejczak, 2020), and improve returns to food security in a healthy ecology (Sciarelli et al., 2021).

Socially responsible investing discipline would help achieve a sustainable growth trajectory in agriculture (Talan et al., 2024), through the reduction of post-harvest loss by injecting value addition (Al Hinai et al., 2022). In return, achieve the 17 Sustainable Development Goals (SDGs) (Talan et al., 2024). Kuznets curve is applicable in managing complex phenomena of economic development and greenhouse gas (GHG) (Bao & Lu, 2023). The environmental Kuznets curve found that the agro-economy is low in developing countries and requires enhancement (Niyigaba et al., 2020). In Kenya, Sarkodie and Ozturk (2020) found an inverted U-shaped effect between economic development and environmental degradation. Therefore, farmers ought to promote socially responsible investing through value addition to achieve sustainable food security (Langangmeilu et al., 2022).

Strategically designed agriculture should prioritize stakeholders' interests, which include value creation, waste reduction, and efficient resource utilization (Alkaraan et al., 2023; Vishal et al., 2022). Hence, to achieve an inverted U-shaped relationship between economic development and environmental degradation (Tripathi et al., 2022), innovative use of technology (Feng et al., 2023) and supportive government policies are required to ensure operative socially responsible investing (Chen et al., 2021). This study focuses on marginalized small-scale farmers of Kariunga-Mutirithia-Naibor, KAMUNA (Segera Ward, Laikipia North sub-County) and Ndathimi (Karaba ward, Laikipia West sub-County) Dam water projects sponsored by the World Bank at Kenya shillings 29.5 million and 16 million, respectively (The World Bank, 2017). The projects envisioned socially responsible investment in agriculture through optimal use of resources (Ruheni et al., 2024b).

The study anchors on Game theory, whose proponent was John von Neumann in 1928. The theory indicates that the economy is not fixed but vibrant and progressive. Therefore, players must be innovative to create new markets and undertake new roles (Mérö, 1998). In this study, value addition in agriculture is the innovative aspect to catalyze agro-preneurship. By extension, fulfilling the requirements of the Kuznets curve hypothesizes to achieve sustainable production in a healthy ecology.

The main objective of this study was to examine whether value addition moderates the relationship between socially responsible investing and the performance of climate-smart agricultural projects. The study employed a cross-sectional survey and correlational design to answer the research question:

RQ: To what extent does value addition moderate the relationship between socially responsible investing and the performance of climate-smart agricultural projects in Laikipia County, Kenya?

The scholarly relevance of this study is fundamentally threefold. First, contribute to the academic discourses. Second, serves as a practical guide for small-scale farmers in effective resource utilization. Finally, forms a basis for policies that support agriculture.

The rest of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 analyses the methodology used to conduct empirical research on the moderating influence of value addition on the relationship between socially responsible investing and the performance of climate-smart agricultural projects. Section 4 details the findings and discussions. Section 5 concludes the paper.

2. LITERATURE REVIEW

Agriculture is one of the major contributors of GHG, accounting for 25% (Zhao et al., 2023). The progressive increase in GHG concentration leads to droughts, food insecurity, poverty, and unusable farmland (Leisner, 2020). Consequently, there is a need for climate-smart agriculture, which has a three-pronged effect, which includes promoting food security, income, and adaptability to climate change (Ma & Rahut, 2024). Therefore, the performance of food security projects should focus on improved production as well as sustainability of the projects. A study by Aryal et al. (2020) in South Asia, found that climate-smart agriculture practices on soil and water management reduce GHG emissions.

Climate-smart agriculture practices increase food production yields and reduce negative effects on the environment (Agyekum et al., 2024; Zizinga et al., 2022). A survey in Ghana, Mali, and Nigeria by Tabe-Ojong et al. (2023) found that climate-smart agriculture promoted yields in crops, enhanced economic access to food, and guaranteed healthy diets in households. A survey by Andati et al. (2023), at Nyandarua in Kenya found that climate-smart technologies promoted and maintained potato yield by 61%. In addition, promoted small-scale farmers' standards of living, and reduced income challenges (Orumo & Mwangi, 2023). Hence, small-scale farmers need to be innovative and engage in socially responsible investment in food production.

Globally, stakeholders have embraced socially responsible investment in agriculture to guarantee international quality standards through the creation of safe and attractive jobs, resource-saving production, environmentally friendly production, and electricity generation from waste. The governments are supporting the initiative through subsidies. In the same breath, Ecuador seeks to design agrarian policies to conform to socially responsible investing (Requelme & Afonso, 2023). Socially responsible investing is imperative to reduce the 21% water and 15% of land lost through the food system (Aragie, 2021). Sub-Saharan Africa has come up with policy agendas in line with the New Green Revolution targeting smallholder agriculture to enable feeding her population, poverty alleviation, heightening national economic development, and generation of biofuel to meet energy needs (Watts & Scales, 2020).

Postharvest and supply chain losses are a global challenge costing fish farming $380 million and 7.8 million tons of growth annually. Strategic techniques in socially responsible investing and education of farmers would tame postharvest losses (Abbas et al., 2024). Though value addition requires investments, it reduces post-harvest loss, enhances the product's value, and guarantees efficient resource utilization. Farmers equipped with post-harvest technology reduce post-harvest losses and poverty, and improve efficiency and productivity (Asige & Omuse, 2022; Hussaini et al., 2021). Hence the need for farmers' cooperatives and extension agents to educate farmers on the need to invest in value addition.

In Kenya, limited infrastructure, complicated land procurement, and inheritance, unsustainable farming practices, and lack of skills in climate-smart agriculture propagate poverty and reduce resilience against environmental shocks for small-scale farmers (Eichsteller et al., 2022). Regressive policies such as taxes on farm inputs, lack of credit, disbanding of farm inputs loan schemes, and lack of irrigation infrastructure negatively affect agriculture (Njora & Yilmaz, 2021). To compensate for the misgivings in the agriculture sector, the food security projects in Laikipia County have infringed on the wetlands of the Ewaso Narok River. The uncontrolled irrigation depletes the river water levels, causing agro-pastoral hostility and human-wildlife animosity (Kamau et al., 2020). In addition, overgrazing by pastoralists leads to the destruction of soil cover, soil erosion, and ultimately soil degradation.

To address myriad of challenges, the formation of co-operatives assists farmers to synergize in processing and marketing their products, networking with multinational food processors to coordinate production, processing, and paying farmers (Tefera et al., 2020). A study by Kirimi et al. (2021) found that skilled farmers adopted banana value addition. However, lack of training has hindered value addition and standard grading systems. Locally made solar-biomass greenhouse dryers complemented by biomass energy could considerably lower the cost of drying foodstuffs to increase their shelf life (Ndirangu et al., 2020). Therefore, value addition is an accessible technology to all farmers.

This study focuses on two projects in Arid and Semi-Arid Lands. Kenya's 17 out of the 47 counties are largely Arid and Semi-Arid Lands. These counties benefited from the World Bank-sponsored Kenya Climate Smart Agriculture Projects at $69.8 million (The World Bank, 2017). The projects targeted small-scale agro-pastoral communities with the intent of promoting: Food security by heightening productivity, promoting the resilience of small-scale farmers, and reducing GHG emissions, through modern farming technology, innovation, and management practices (Ruheni et al., 2024a).

KAMUNA is an integrated irrigation project comprising 300 small-scale farmers with the following activities: a borehole, desilting of Naibor dam, and water distribution of Kariunga and Mutirithia (Ruheni et al., 2024a). The 212 small-scale farmers of the Ndathimi Dam water project was initiated in 2019 in Karaba. The project involves desilting the dam, erecting walls and spillways raising water tanks, and installing solar-powered pumps (Ruheni et al., 2024a). The community-based organizations implemented the projects under the oversight of the Laikipia County Government, major in fruit and fish farming, afforestation, and beekeeping (County Government of Laikipia, 2021).

The conceptual framework Figure A.1 (see Appendix A) details the four independent variables: *capacity planning*, *resource allocation*, *resource procurement*, and *resource stewardship*. When combined, the four variables form the composite variable, *socially responsible investing*. *Value addition* is the moderating variable and the *performance of climate-smart agriculture* is the dependent variable. The null hypothesis (H_0) in this study advances that there is no significant moderating influence of value addition on the relationship between socially responsible investing and the performance of climate-smart agricultural projects. Gerber et al. (2024) found that socially responsible investing catalyzes the climate resilience of agricultural projects. However, value addition in moderating this relationship remains unclear. While Ngugi et al. (2020) found that value addition was a good moderating variable for agricultural produce. A study by Malec et al. (2024) in Central Africa found that the role of value addition might not enhance the performance of such projects. Therefore, the potential moderating effect of value addition is not conclusive, warranting further investigation.

3. MATERIALS AND METHOD

This study unit of analysis was two World Bank-sponsored climate-smart agriculture dam projects, namely, the KAMUNA project (Segera Ward) with 300 small-scale farmers and the Ndathimi Dam project (Karaba Ward), with 212 small-scale farmers, respectively. The study employed Yamane's (1967) formula to draw a sample size of 221 respondents. In addition, the study purposefully sampled four key informants, the officers from the county government and the Ministry of Agriculture, the Livestock and Fisheries, and the two project managers. The questionnaires assisted in soliciting information from 203 small-scale farmers.

The study employed a cross-sectional survey and correlational research design. However, a longitudinal research design would have derived objective results as it observes the phenomenon repeatedly over time. The data collection instruments employed were a questionnaire for quantitative data collection, an interview guide, and an observation guide for qualitative data meant for triangulation. Pilot testing helped to ascertain the study's feasibility. Also, verified the reliability and validity of the instruments, prior to the actual study. The pilot test had 22 administered questionnaires. The reliability alpha coefficient for all the variables ranged from 0.684 to 0.906, which is acceptable. The instruments exhibited high construct validity as they all surpassed the factor analysis 0.40 threshold. Statistical assumptions involved testing for linearity and returned an elevated value of deviation (p-value > 0.05).

The normality test used Kolmogorov-Smirnov and Shapiro-Wilk factor analysis and returned values greater than 0.05. The multicollinearity was tested using the variance inflation factor, while homoscedasticity was tested using the coefficient of variation and scatterplots, and the results were favorable. Therefore, the data fulfilled the required assumptions for regression analysis.

The alternative research design to undertake the study would be longitudinal research, as it would give more unbiased findings as it is an observational research design capable of repeatedly collecting both quantitative and qualitative data over time, giving a clear view of a phenomenon (Audulv et al., 2022).

4. RESULTS AND DISCUSSION

The study assessed the performance of food climate-smart agricultural projects focusing on 1) the sufficiency of food produced by the small-scale farmers in the projects; 2) farmers generating enough revenue from the sale of produce; 3) environmentally friendly food product process; 4) ensuring chemicals were not leaked into rivers; 5) ensuring food poisoning from locally produced foods had never been experienced amongst the members of the project; 6) constant produce quantity being produced year in and year out, and vii. farmers have flexibility in facing challenges encountered in food production. The descriptive analysis returned a weight composite mean of 2.82 out of five indicating respondents held the opinion that the projects' performance was doing fairly well. The composite standard deviation was 1.123 indicating minimal divergence in opinion.

Results from the interview and observation showed that respondents benefited from the project in terms of food, income, experience, and their farms practicing forest agriculture. However, drought, insecurity, and conflicts hindered the projects' potential. The combined socially responsible investing involved measuring capacity planning, resource allocation, resource procurement, and resource stewardship.

Table 1. Descriptive analysis of combined socially responsible investing and performance climate-smart agricultural projects

Variable dimension/indicator	*Mean (M)*	*Std. Dev.*
Capacity planning	2.88	1.219
Resource allocation	3.52	1.143
Resource procurement	3.25	1.163
Resource stewardship	3.47	1.138
Composite mean and standard deviation	**3.28**	**1.166**

Table 1 details the results of the combined socially responsible investing mean as 3.28. The moderately high score supports Muhie (2022) who found that socially responsible investing through a climate-smart agriculture approach is the solution for sustainable production and food and nutrition security. The composite standard deviation was 1.166 indicating convergence in opinion.

The correlation coefficient for combined socially responsible investing and performance of climate-smart agricultural projects ($R = 0.665$) at p-value $0.000 < 0.05$, supported Malec et al. (2024) who found that investing in innovation promoted food security and nutrient-rich foods in Southern and Western Africa. Regression analysis gave a correlation coefficient of $r = 0.665$. This indicated that all combined indicators of socially responsible investing had a strong association with the performance of climate-smart agricultural projects. The results on adjusted R-squared ($R^2 = 0.430$), implied that this model explained 43.0% of the total variations in the performance of climate-smart agricultural projects.

ANOVA, F-statistics (4, 198) = 39.146 was consequential at p-value $0.000 < 0.05$. This implied that the predictor coefficient was at minimum not equal to zero and the regression model allowed the prediction of the performance of climate-smart agricultural projects by combined socially responsible investing. Also, a unit increase ($\beta_1 = 0.532$) in capacity planning, and the performance of climate-smart agricultural projects would increase by 53.2%.

Resource stewardship (p-value $= 0.435 > 0.05$) was not a good predictor within the combined model of socially responsible investing. On this predictor, for a unit increase ($\beta_4 = 0.042$), only 4.2% was realized in the performance of climate-smart agricultural projects. Resource procurement was significant (p-value $= 0.020 < 0.05$), and the standardized beta value ($\beta_3 = 0.135$) showed that it could lead to a 13.5% increase in the performance of climate-smart agricultural projects, thus it was a good predictor within the model. A negative standardized beta value ($\beta_2 = -0.129$) meant, that for a unit decrease in resource allocation, the performance of climate-smart agricultural projects was likely to decrease by 12.9%. Resource planning was consequential at p-value $= 0.000 < 0.05$ level of significance. It is uncommon to find some coefficient values insignificant in the multivariate analysis but they were not deleted. Hair et al. (2010) advised that the purpose of such coefficients in a model was to caution or communicate something vital that should be taken care of in future studies. The study regression model was as follows:

$$Y = 0 + 0.532X_1 + 0.129X_2 + 0.135X_3 + 0.042X_4 \quad (1)$$

hence,

$$Y = (-0.532X_1) + (-0.129X_2) + (0.135X_3) + (0.042X_4) \quad (2)$$

where:

- Y = Performance of climate-smart agricultural projects;
- X_1 = Capacity planning;
- X_2 = Resource allocation;
- X_3 = Resource procurement;
- X_4 = Resource stewardship.

It should be noted that when standardized beta values are used in a multiple regression model, the constant (β_0) does not apply unless it is in simple linear regression where unstandardized β coefficient values apply. The overall F-statistics ($F = 39.146$) was less than the critical value of 2.417 confirming the model's goodness of fit. The model was also significant given the p-value $= 0.000 < 0.05$ which implied the existence of a statistically consequential relationship between combined socially responsible investing and the performance of small-scale farmers' food security. Hence, rejecting the H_0 and concluding that combined socially responsible investing had a consequential association with the performance of climate-smart agricultural projects. The findings resonated with Akuno and Wanyoike (2020) who found that a detailed resource plan should be developed before the commencement of every project.

The study assessed value addition as a factor affecting the performance of climate-smart agricultural projects and the results are detailed in (Table 2).

Table 2. Value addition and performance of climate-smart agricultural projects

Statement	*SD(1) F %*	*D(2) F %*	*N(3) F %*	*S(4) F %*	*SA(5) F %*	*Total F %*	*M*	*SD*
1. Farmers practice value addition.	26 (12.8%)	28 (13.8%)	39 (19.2%)	66 (32.5%)	44 (21.7%)	203 100%	3.36	1.311
2. Quality control is a priority during the processing of farm products.	23 (11.3%)	28 (13.8%)	38 (18.7%)	68 (33.5%)	46 (22.7%)	203 100%	3.42	1.289
3. Value addition helps farmers to come up with competitive prices for their products.	12 (5.9%)	41 (20.2%)	36 (17.7%)	70 (34.5%)	44 (21.7%)	203 100%	3.46	1.203
4. Farm products have diverse market reach.	21 (10.3%)	33 (16.3%)	33 (16.3%)	68 (33.5%)	48 (23.6%)	203 100%	3.44	1.294
5. Farmers are skilled in post-harvest handling.	17 (8.4%)	38 (18.7%)	32 (15.8%)	68 (33.5%)	48 (23.6%)	203 100%	3.45	1.267
Composite mean and composite standard deviation							**3.43**	**1.273**

Table 2 presents result for each line item of the last objective of the study which was also measured on a Likert scale of 1–5, where 1 = Strongly disagree (SD), 2 = Disagree (D), 3 = Neutral (N), 4 = Agree (A), and 5 = Strongly agree (SA).

Statement 1, farmers practiced value addition, averaged to 3.36 versus 3.43 as the composite mean, highlighting that farmers did not practice value addition. The findings supported Yeboah et al. (2020) who found in rural areas, farm products were not value-added. Item standard deviation of 1.311 versus 1.273 as composite standard deviation meant that the respondents' opinions were divergent. This supported Gelgo et al. (2023) who found that policies to accelerate the value addition of agricultural products in East Africa were critical

Statement 2, quality control was a priority during the processing of farm products, averaged to 3.42 versus 3.43 as composite mean. Hence, farmers practiced quality control, although still below average, therefore, a need for training. This supported Gelgo et al. (2023) that institutional quality is critical in driving agricultural value-addition in East Africa. The item standard deviation of 1.289 and 1.273 as composite standard deviation showed divergent opinions. The findings supported Milanović et al.'s (2020) study in the Serbia Republic, which found that for farm products to remain competitive in the global market and fetch good prices, quality was fundamental.

Statement 3, value addition helps farmers to come up with competitive prices for their products, averaged as 3.46 versus 3.43 as composite mean, meant that having value addition would enable them to have competitive prices in the market. This supported Asige and Omuse (2022) who found that value addition led to more markets for farm products. A line standard deviation of 1.203 versus 1.273 as a composite standard deviation implied, convergence in the responses. Findings support Milanović et al. (2020) who found that for farm products to fetch good prices required value addition to guarantee quality.

Statement 4, farm products had diverse market reach, averaging 3.44 versus 3.43 as the composite mean, highlighting that farm products had access to a diverse market. Supporting Kipkogei et al. (2024) who opined cooperatives provide a synergistic environment leading to effective productivity and income. A line standard deviation of 1.294 versus 1.273 as a composite standard deviation of implied responses was divergent or inconsistent. Findings contradicted Hussaini et al. (2021) who found that value addition improved the efficiency of food security projects and reduced poverty.

Statement 5, farmers were skilled in post-harvest handling, averaged to 3.45 versus 3.43 as a composite mean, meant that farmers had post-harvest handling skills. This supported Asige and Omuse (2022) who found that value additional skills were fundamental. Item standard deviations of 1.267 and 1.273, as a composite standard deviation, meant that respondents were consistent and thus convergence. Asige and Omuse (2022) further alluded that farmers were skilled and equipped with post-harvest technology, which influenced food security.

To examine the value-addition moderating influence on the association linking socially responsible investing and the performance of climate-smart agricultural projects, Pearson's correlation coefficient was adopted at 0.05 level of significance. Table 3 details the correlation results.

Table 3. Correlation analysis between value addition and performance of climate-smart agricultural projects

Variable		*Value addition*	*Performance of climate-smart agricultural projects*
Value addition	Pearson correlation	1	-0.050**
	Sig. (2-tailed)		0.478
	N	203	203
Performance of climate-smart agricultural projects	Pearson correlation	0.889**	1
	Sig. (2-tailed)	0.478	
	N	203	203

*Note: ** Correlation is significant at 0.05 level of significance (2-tailed).*

Table 3 results, presented a negative weak association between value addition and performance of climate-smart agricultural projects (r = -0.050), and this association was insignificant (p-value = 0.478 > 0.05). This could be justified due to a three-year drought that had affected the entire country, reducing farming to barely subsistence farming. Nonetheless, the findings differed from Ngugi et al. (2020) who found that value addition boosted agricultural production.

Moderation focused on assessing the variation of the independent variable when the moderator (value addition) was added to the model. The following is the model: *Performance of climate-smart agricultural projects = f (capacity planning + resource allocation + resource procurement + resource stewardship + value addition).*

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_1 X_2 X_3 X_4 X_5 + \varepsilon \quad (3)$$

where:

- Y = Performance of climate-smart agricultural projects;
- β_0 = Constant;
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = Beta coefficients;
- X_1 = Capacity planning;
- X_2 = Resource allocation;
- X_3 = Resource procurement;
- X_4 = Resource stewardship;
- X_5 = Value addition;
- ($X_1X_2X_3X_4X_5$) = Interaction term (product of $X_1X_2X_3X_4X_5$);
- ε = error term.

The process of moderation was conducted using Baron and Kenny (1986). This was done in two steps:

Step 1: The independent variable *socially responsible investing* was regressed on the performance of climate-smart agricultural projects (Table 4).

Step 2*:* An interaction term (value addition) was introduced into the second regression model to test its influence and usefulness (Table 4).

Table 4. Regression analysis on moderating influence of value addition on the relationship between socially responsible investing and performance of climate-smart agricultural projects

Model summary[c]									
Model	*R*	*R-squared*	*Adjusted R-squared*	*Std. error of the estimate*	*Change statistics*				
					R-squared change	*F change*	*df1*	*df2*	*Sig. F change*
1	0.6653[a]	0.442	0.430	0.39433	0.442	39.146	4	198	0.000
2	0.667[b]	0.445	0.431	0.39426	0.003	1.069	1	197	0.302

ANOVA[a]						
Model		*Sum of squares*	*df*	*Mean square*	*F*	*Sig.*
1	Regression	24.348	4	6.087	39.146	0.000[b]
	Residual	30.788	198	0.155		
	Total	**55.136**	**202**			
2	Regression	24.514	5	4.903	31.542	0.000[c]
	Residual	30.622	197	0.155		
	Total	**55.136**	**202**			

Coefficients[a]											
Model		*Unstandardized coefficients*		*Standardized coefficients*	*T*	*Sig.*	*Correlations*			*Collinearity statistics*	
		B	*Std. error*	*Beta*			*Zero-order*	*Partial*	*Part*	*Tolerance*	*VIF*
1	(Constant)	1.637	0.220		7.443	0.813					
	CapacityP	0.408	0.057	0.532	7.155	0.000	0.644	-0.054	0.453	0.510	1.692
	ResourceA	-0.091	0.039	-0.129	-2.353	0.020	-0.220	0.305	-0.165	0.942	1.061
	ResourceP	0.072	0.040	0.135	1.822	0.070	0.524	0.255	0.128	0.512	1.954
	ResourceS	0.028	0.036	0.042	0.782	0.435	-0.007	0.025	0.055	0.963	1.039
2	(Constant)	1.629	0.220		7.405	0.000					
	CapacityP	0.403	0.057	0.527	7.063	0.000	0.644	-0.423	0.449	0.507	1.972
	ResourceA	-0.083	0.040	-0.117	-2.095	0.037	-0.220	0.311	-0.148	0.903	1.107
	ResourceP	0.079	0.040	0.147	1.956	0.052	0.524	0.021	0.138	0.500	1.999
	ResourceS	0.049	0.042	0.074	1.189	0.236	-0.007	-0.026	0.084	0.731	1.367
	ValueAdd	-0.030	0.029	-0.066	-1.034	0.302	-0.050	0.848	-0.073	0.693	1.444

Note: a. Dependent variable: PerformanceP.
b. Predictors: (Constant), CapacityP, ResourceA, ResourceP, ResourceS.
c. Predictors: (Constant), CapacityP, ResourceA, ResourceP, ResourceS, ValueAdd.

The results under the model summary (Table 4) indicated that on introducing socially responsible investing in the first model, the second model interaction term increased the adjusted R-squared from 0.430 representing 43.0% to 0.431 representing 43.1%. This implied that the interaction between value addition and socially responsible investing could only increase by 0.1% variations in performance or food security projects. To be able to identify the variation in the novel R-squared founded on the linear influence of variables introduced into the model, holding the additional variables constant, the results from (Table 4) model summary implied, R-squared change for the second model (0.003) was lower than the first model (0.442 thus no change. The calculated F-statistics (F = 31.542) was higher than the critical value of 2.26 which showed the model's goodness of fit. It was also evident that with a *p*-value of $0.302 > 0.05$, the model was insignificant. Thus, H_0 was rejected and maintained that value addition had no association with the performance of the small-scale farmers' food security projects. This accrued to the following model:

$$Y = 0 + (-0.341X_1) + (0.248X_2) + (0.016X_3) + (-0.018X_4) + (0.917X_5) \quad (4)$$

hence,

$$Y = -0.341X_1 + 0.248X_2 + 0.016X_3 - 0.018X_4 + 0.917X_5 \quad (5)$$

where:

- Y = Performance of climate-smart agricultural projects;
- β_0 = Constant (1.437 can only apply when the unstandardized β values are used, i.e. in simple linear regression);
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Beta coefficients;
- X_1 = Capacity planning;
- X_2 = Resource allocation;
- X_3 = Resource procurement;
- X_4 = Resource stewardship;
- X_5 = Value addition;

The hierarchical regression model in step 2 (Table 4) revealed that a unit increase in capacity planning (0.527) corresponded with a 52.7% increase in project performance. A unit decrease in resource allocation (-0.117) corresponds with an 11.7% decrease in project performance. Results also showed that with a unit increase in resource procurement (0.147), the performance of climate-smart agricultural projects would increase or improve at 14.7%. On resource stewardship, a unit increase (0.074) leads to a 7.4% increase in project performance. Lastly, when value addition was introduced, the results showed that for a unit decrease in value addition (-0.066), the performance of small-scale farmers' food security projects would decrease by 6.6%. At this point, it was evident that value addition should be part of the food security projects to realize maximum benefits. Excluding this moderator from food security activities would compromise the performance of small-scale farmers' food security projects.

Using part values (Table 4) to explain further the results given by the standardized beta coefficients, we note that -0.073 for value addition emphasized that this variable was not fully embraced. Further, the result implied that although value addition may serve as a good moderator in the hierarchical regression model of this study, it lacked proper attention and failed to fit in the model on a positive integer. Based on p-value = 0.302 > 0.5, thus failed to reject H_0 and concluded that value addition had no significant association with the relationship between combined socially responsible investing and performance of climate-smart agricultural projects. This supported Malec et al. (2024) who found that investing in innovation worsened food security in Central Africa. A similar study by Gelgo et al. (2023) in East Africa found that institutional effectiveness is required for farmers to start value-adding in agriculture. In addition, to promote value addition in agricultural products, pro-agriculture policies are required to enhance prices. Moreover, the prevailing three-year drought during the time of the study curtailed farmers from producing sufficient food. Therefore, the households consumed most of the food produced. There was no food surplus food for value-addition and marketing.

5. CONCLUSION

Value addition is important in heightening the performance of climate-smart agricultural projects. However, Abraham Maslow's hierarchy of needs theory applies, droughts, conflicts, insecurity, and insufficient resources put farmers' capacity to produce in jeopardy. Farmers could not practice value addition as the produce was insufficient due to three years of drought, insecurity from cattle rustlers, and wildlife. Security in the environment is fundamental before farmers may engage in value addition or commercialized agriculture (Manolova et al., 2023). In addition, institutional effectiveness and pro-agriculture policies are required to enhance prices, to motivate farmers to do value addition (Gelgo et al., 2023). Therefore, there is a need for policies to guarantee the allocation of public goods such as security, roads, and irrigation infrastructure to transform agriculture from a climate-reliant and subsistence level to a commercial level. At this level, food production becomes sustainable as it generates commensurate revenue for the farmers, and the output of global warming-causing gases is minimal.

The scholarly relevance of this study is fundamentally threefold. First, the findings will contribute to the academic discourses and inject solutions into socially responsible investing in agriculture. Next, the study furnishes a practical guide for small-scale farmers to allocate resources effectively, for enhanced food production and progressive achievement of SDGs. Then, the findings will form a basis for policies in agriculture to support small-scale farmers. Further study is required in the area to unravel underlying issues leading to fluctuating production and usurping farmers' resilience.

Based on the findings the study proposes first, the creation of a policy framework to guarantee sufficient funding of the agricultural sector to facilitate small-scale farmers with irrigation infrastructure, reduce the cost of inputs then, enforce findings of previous commissions to heighten security and reduce agro-pastoral and human-wildlife conflicts. Finally, promote the formation of cooperatives by farmers to ensure value addition and leverage economies of scale.

The limitation of the study was the research method. The research design takes place at a single point in time. Moreover, a longitudinal research design would have derived objective results as it observes the phenomenon repeatedly over time.

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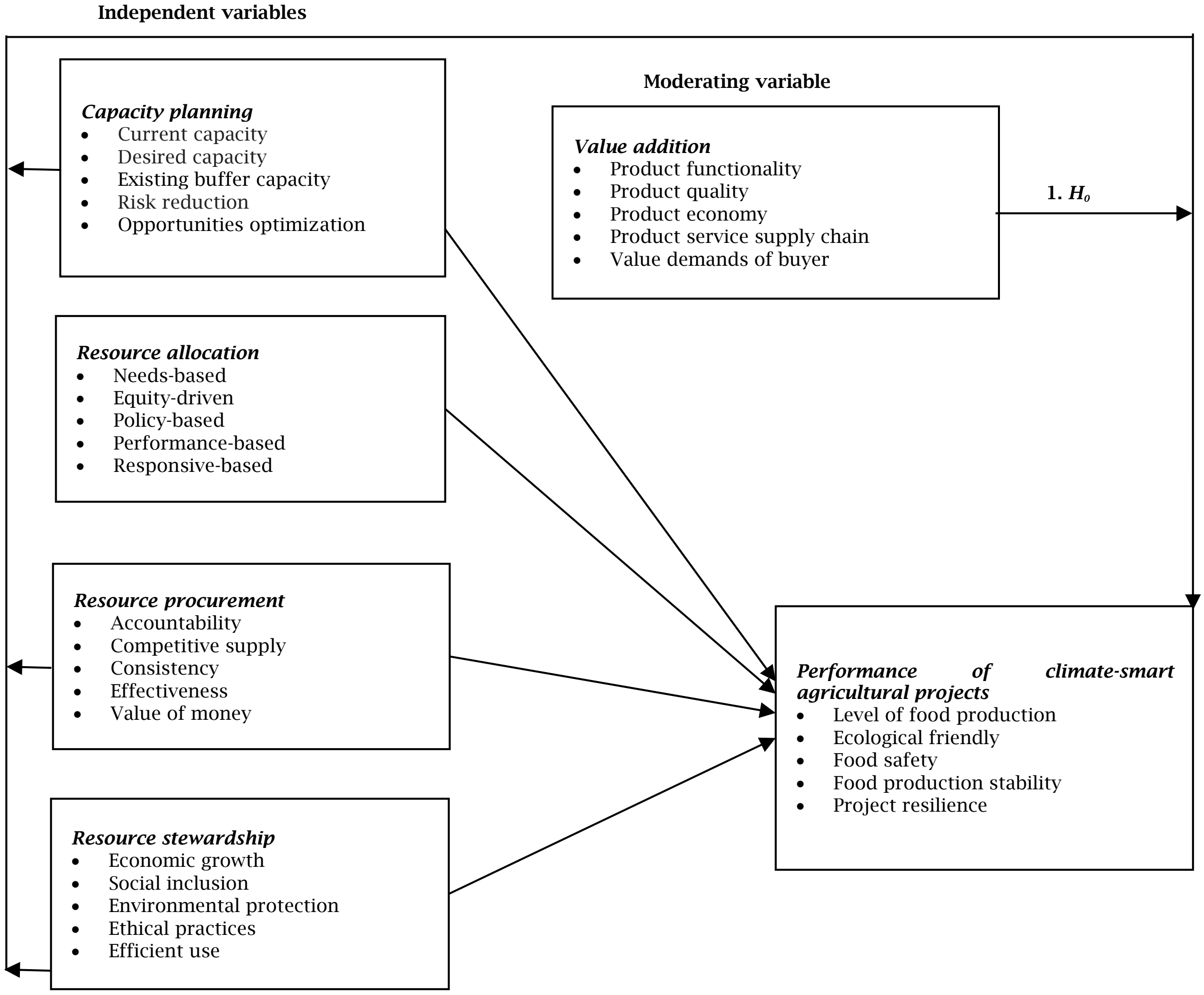
APPENDIX A

Figure A.1. Conceptual framework of socially responsible investing and performance of climate-smart agricultural projects



APPENDIX B. QUESTIONNAIRE FOR KAMUNA AND NDATHIMI DAMS CLIMATE-SMART AGRICULTURAL PROJECTS IN LAIKIPIA COUNTY

Instructions
The purpose of this study is to investigate socially responsible investing, value addition, and performance of Kariunga-Mutirithia-Naibor and Ndathimi Dams food security projects in Laikipia County. Your participation is highly valued and your information will be held in confidence.

Section A: Demographic information of respondents
Tick appropriately

1. Please specify your gender
   a) Male { } b) Female { }
2. Please specify in which age group you fall in.
   a) 18–29 { } b) 30–39 { } c) 40–49 { } d) 50 and above { }
3. Please specify the level of education attained.
   a) Primary school and below { } b) High school { } c) Certificate { }
   d) Diploma { } e) Postgraduate and above { }

Section B: Performance of climate-smart agricultural projects
This section contains statements on the performance of small-scale farmers' food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	Enough food is produced.					
2	Farmers generate enough revenue from the sale of farm products.					
3	The production process is environmentally friendly.					
4	Chemicals are not leaked into rivers.					
5	Food poisoning from locally produced foods has never been experienced.					
6	Produce quantity is constant year in and year out.					
7	There is flexibility in facing challenges encountered in food production.					

Section C: Capacity planning
This section contains statements on capacity building in view of food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	There is access to land for food production.					
2	There is access to water for food production.					
3	Food secure projects have a constant supply of resources to support productivity.					
4	There are mitigation measures for all the risks identified.					
5	The uptake of technological innovation is embraced by farmers.					
6	Farmers leverage on the existing extension services offered by the available agricultural research institutes.					
7	Farmers have secured insurance policies/covers to support their agricultural activities.					

Section D: Resource allocation
This section contains statements on resource allocation in view of food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	Existing production needs determine how resources are allocated					
2	Equity is a foundational factor on which resources are allocated.					
3	Project rules and guidelines are adhered to while allocating resources.					
4	Resources allocation is determined by the performance of different sub-projects.					
5	Resource allocation is responsive to project members.					

Section E: Resource procurement

This section contains statements on resource procurement in view of food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	There is accountability in the procurement of resources					
2	Competitiveness by suppliers is considered during procurement.					
3	There is consistency with the project suppliers					
4	Procurement is conducted efficiently					
5	Value for money is a factor in the procurement of resources.					

Section F: Resource stewardship

This section contains statements on resource stewardship in view of food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	Economic growth is considered during resource utilization for production.					
2	There is social inclusion in project resource stewardship.					
3	The project appreciates environmentally friendly activities during food production.					
4	Ethics are observed in resource utilization.					
5	Farmers efficiently utilize resources.					

Section G: Value addition

This section contains statements on value addition in view of food security projects. Based on your experience on these projects, please specify your opinion on each of the statements below by ticking the appropriate scale of 1–5 among the following: 1 — Strongly disagree (SD), 2 — Disagree (D), 3 — Neutral (N), 4 — Agree (A), 5 — Strongly agree (SA).

Item	*Statement*	*1*	*2*	*3*	*4*	*5*
1	Farmers practice value addition.					
2	Quality control is a priority during the processing of farm products.					
3	Value addition helps farmers to come up with competitive prices for their products.					
4	Farm products have a diverse market reach.					
5	Farmers are skilled in post-harvest handling.					