Influence of Organizational Culture on the Adoption ofSolar Photovoltaics in Climate-Smart Agriculture in Uasin Gishu County, Kenya

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Abstract

The study aimed to examine organizational culture's influence on the adoption of solar energy technology in climate-smart agriculture in Uasin Gishu County, Kenya. The study adopted a positivist philosophy and a descriptive correlational research design targeting the county's 240 executive, policy, legislative, and decision-making level staff as of December 2022. Data was collected using a structured questionnaire that was pilot-tested and refined before final data collection. Data collected was analyzed in terms of descriptive and inferential statistics using SPSS version 28. The results revealed a strong association between the organizational culture dimension and solar PV adoption as indicated by the Chi-Square test, χ^2 (2456, N = 152) = 2422.525, $p < .05$, while regression revealed that the organizational culture dimension significantly predicted solar PV adoption, (β = 1.686, t (152) = 17.360, $p < .05$). Given the results, the study rejected the null hypothesis that the organizational culture dimension of strategic leadership had no significant influence on solar PV adoption in the county, the study concluded that the organizational culture dimension elements were important for improved solar technology adoption. The study further recommended that the county develop an organizational culture that appreciates that climate change is a global phenomenon and ensures staff engagement and alignment with the objectives of solar PV adoption for climate change mitigation.

Keywords: Organization culture, solar PV adoption, stakeholder perceptions, climate-smart agriculture

Introduction

Organizational culture creates a conducive environment for strategy formulation and implementation by influencing how the organization conducts its business and the processes used to regulate and control behaviors and attitudes for employee motivation and competitive advantage (Soomro & Shah, 2019). Senior executives' leadership behaviors significantly influence organizational culture, while a flexible organizational culture moderates the relationship between strategic leadership behaviors and strategic business alignment (Shao, 2019). The practices also inspire employees and engender an organizational cultural practice.

Leaders provide moral and ethical guidance and possess personal characteristics that support value systems that inspire others to adopt new ways and change for improved organizational culture and performance.

Joseph and Kibera (2019) identified organizational culture as a critical intangible resource that was usually incapable of imitation and had a decisive influence on performance. They proposed that organizational culture should serve the dual roles of adapting to external environment changes and enabling internal integration. Oloo (2021) opines that the performance of Kenya's land administration function would improve if strategic thinking were employed and improvements in organizational culture and the use of information technology and innovation were adopted. To identify the dimensions that influence performance in innovation, Alexe and Alexe (2018) found out that organizational culture varied from one firm to another and that the firms attached great significance to the elements that created the organizational culture. Compared to the developed world, only a few studies exist on the specific influence of the organizational culture dimension of strategic leadership on solar PV adoption in Africa. These studies are, however, also inconsistent with efforts required to mitigate climate change using technologies like solar PV (Pascaris et al., 2021).

To stimulate adoption, leaders in organizations and governments have developed policies and strategies to improve accessibility and affordability. Zander et al. (2019) confirmed that introducing flexible payment systems in Australia helped accelerate the adoption of solar PV rooftops. In the agricultural sector, policies to support Agri voltaic adoption have recently emerged, as reported by (Sekiyama & Nagashima, 2019; Schindele et al., 2020). Minimal empirical studies are, however, available on the adoption of solar photovoltaic systems in developing countries, with most being in the developed world and especially those linking organizational culture dimension of strategic leadership and the adoption of solar photovoltaic technologies and products for Climate Smart Agriculture in general and Uasin Gishu County in particular. Statistics show that the challenges facing the adoption of solar PV in Uasin Gishu County are varied, with 30% indicating cost factors about 30% intermittent and unstable nature of solar PV. At the same time, a similar percentage is attributed to a lack of skilled technical personnel (Mureya et al., 2020). However, the study did not investigate the influence of leadership, especially the organizational culture dimension of strategic leadership, with many studies concurring that there needs to be more empirical literature on the association between the organizational culture dimension and solar PV adoption. This study aimed to examine organizational culture's influence on the adoption of solar energy technology in climate-smart agriculture in Uasin Gishu County, Kenya.

Literature Review

Solar PV Adoption

By applying the organizational culture dimension of strategic leadership, Kumar and Zattoni, 2018) concluded that senior executives' leadership behaviors significantly influenced organizational culture and that a flexible organizational culture influenced business strategy and performance. Elsewhere, Girardeau, Oberholzer, and Pattanayak (2021) found that the availability of substitutes and product subsidies have a positive influence in creating an enabling environment for solar PV adoption. Similarly, Organizational culture creates a conducive environment for strategy formulation and implementation for competitive advantage through its influence on how organizations conduct their businesses, including the processes needed to control and regulate behavior.

Employee activities and work attitudes are also increasingly receiving attention for their influence in focusing attention on environmental problems and necessary climate change mitigation initiatives, such as the development of green mitigation measures like solar PV adoption (Al-Swidi et al., 2021). Imran et al. (2021) confirmed this by examining green organizational culture and its impact on overall organizational performance. They concluded that green organizational culture was an essential predictor of green organizational performance in Malaysian industrial and service organizations. In examining how green vision and organizational culture influenced green product development in organizations, Chen et al. (2020) opine that green vision and environmental culture positively impacted green product development performance that supported the development of green products like solar PV for climate change mitigation. Afum et al. (2020) concluded that green organizational culture significantly predicted organizational environmental performance and that environmental management practices like green manufacturing and green procurement had a positive effect on green organizational culture.

Organizational Culture Dimension

Studies, however, show that an organizational culture that allows for too much risk-taking may fail to meet set organizational objectives and, hence, a need for a review of internal structures to mitigate against the consequences of the risks (Kumar & Zattoni, 2018) for the benefit of all stakeholders. Shao (2019) concluded that senior executives' leadership behaviors significantly influenced organizational culture and that a flexible organizational culture moderated the relationship between strategic leadership behaviors and strategic business alignment. This study, however, focused on three elements: a culture of customer focus, alignment of organizational culture to solar PV adoption, and green cultural orientation.

Studies also show that cultural measures related significantly to customer satisfaction (Gillespie et al., 2008; Wang & Lai, 2018) Gillespie, Denison, Haaland, Smerek, and Neale (2008) sought to test the relationship between organizational culture and customer satisfaction using business-unit data from several varied businesses and results indicated that the culture measures related significantly to customer satisfaction and this was confirmed by Famiyeh, Asante-Darko and Kwarteng (2018) wherein the moderating effect of organization culture on customer satisfaction with results indicating that organizational culture strengthened the relationship between service quality and customer satisfaction and that firms should build organizational cultures that commit employees to provide quality services that support customer satisfaction.

Shah et al. (2021) examined the role of green economic organizational culture and green psychological climate, and findings showed that green psychological climate and green organizational culture positively affected green HR management. Another study (Shao, 2019) on the effect of strategic leadership behaviors and organizational culture on business strategic alignment determined that a flexible and adaptive organizational culture positively influenced the relationship between strategic leadership and business strategic alignment. Asaah et al. (2020) examined the effect of organizational cultural orientations on product innovation with the moderating effect of external motivators on such relationships. Findings indicated that innovation-oriented and competition-oriented cultures positively influenced product innovation and put the onus on organizations to design strategies to communicate and support their sustainability claims through sustainability-friendly marketing initiatives directed at a broad consumer base.

Leader acceptance of climate change influenced farmer acceptance and public attitudes toward mitigation measures to be adopted (Ricart et al., 2018). The authors contended that the perception and awareness of climate change at the farm level influenced farmer acceptability and attribution of climate change to human activity and concluded that most farmers believed and accepted that climate change was real and was occurring. Risk perception is influenced by the physical and devastating effects of natural calamities caused by climate change, which wreak havoc on world populations, causing untold misery and loss (Hussain et al., 2020). Their review of the influence of climate change on the adaptation and mitigation actions of natural calamities in Pakistan showed that greenhouse gas emissions caused climate change, which affected agricultural production, weather patterns, food systems, water availability, and energy security and influenced mitigation measures to be adopted, including solar PV adoption.

Methodology

This study adopted a positive research philosophy targeting all the senior employees of Uasin Gishu County in the executive, policy, legislative, and decision-making positions. A census was applied to the population. Data was collected using self-administered online questionnaires. The proposal was presented to the school for approval, followed by an ethical review by the Institutional Review Board (IRB) and submission to NACOSTI for a research permit. Upon permit issuance, piloting was conducted to determine the reliability and validity of the research tools. Data was analyzed using descriptive and inferential statistics, including frequency distribution, mean and standard deviation, factor analysis, statistical tests, Chi-Square test, ANOVA, and regression analysis.

Results

This sub-section presents the results and findings of the data analysis and is presented as guided by the objective. A total of 240 questionnaires were administered, with twenty-four for the pilot test. Two hundred sixteen questionnaires were administered for the primary data collection, and 152 responses were received, representing a response rate of 70.4%.

Demographic Information

The demographic information included the gender of respondents, level of education, monthly farmer income, position of respondent in county government, and years of service in the county government. Results in Table 1 indicate that the county had a higher female population than males at 51.3%; however, most were in the lower management cadres. The modal farmer income level was Kshs 20,001 to Kshs 40,000 at 40.1%, and the position distribution in county government indicated that category 5 accounted for 44.7% of the respondents. Most employees, 46.1% had served in the county for 6 to 10 years.

Table 1. Demographic results

Demographic Variables	Results	
Gender of Respondents	1 = Male	48.7%
	2 = Female	51.3%
Level of Education	1 = Doctoral degree	0.7%
	2 = Master's degree	21.7%

	3 = Bachelor's degree	42.8%
	4 = Post-secondary certificate	28.3%
	5 = Others	6.6%
Monthly Income of Farmers	1 = Below Kshs. 20,000/=	19.1%
	2 = Kshs. 20,001 to 40,000	40.1%
	3 = Kshs. 40,001 to 60,000	33.6%
	4 = Kshs. 60,000 to 80,000	5.9%
	5 = Over Kshs. 80,001	1.3%
Position in county government	1 = CEO/Deputy CEO	1.3
	2 = CEC, Speaker, Chief officer	19.1%
	3 = Director, MCA	19.7%
	4 = Clerk to CA, D/Director	15.1%
	5 = Ward rep, CSA staff, and Others	44.7%
Years of service in county government	1 = Below 5 years	16.4%
	2 = 6 to 10 years	46.1%
	3 = 11 to 20 years	15.1%
	4 = 21 to 30 years	8.6%
	5 = Over 30 years	13.8%

Descriptive Statistics on Organizational Culture and Adoption of Solar PV

The study aimed to find out how the organizational culture influenced solar PV energy adoption in Climate Smart Agriculture (CSA) in UG County, Kenya. Table 2 summarizes the results, and from the analysis of responses to the research questionnaire, respondents agreed that UG leadership supports the adoption of solar PV adoption (*M = 2.54, SD = 1.144*) and agreed on "Senior executive influence on organizational culture" for solar PV adoption (*M = 2.24, SD = 1.138*).

Table 2. Organizational Culture Dimension and Solar PV Adoption

Organizational Culture Dimension of Str. Leadership	**N**	**Mean**	**Std Deviation**
Culture of customer focus in solar adoption.	152	2.66	1.229
Green customer behavior protocol for climate mitigation	152	2.74	1.280
Green customer value orientation for climate mitigation	152	2.91	1.334
Green consumer advertising for climate mitigation.	152	2.68	1.070
Align organizational culture to solar adoption	152	2.68	1.210
Internal structures to help mitigate climate change	152	2.54	1.342
Executive influence on org culture on solar adoption	152	2.24	1.138
Organizational culture in day-to-day operations	152	2.54	1.217
Green cultural orientation in operational practice	152	2.67	1.195

Support green leadership behavior by management	152	2.54	1.144
Green supply chain mngt for climate mitigation	152	2.64	1.160
Adopt a green market orientation for performance.	152	2.71	1.046

Correlation Between Organizational Culture and Solar PV Adoption

Results in Table 3 show that organizational culture had a strong positive and significant association with the solar PV adoption {r (152) = .585, p < .05, r (152) = .677, p < .05 and r (152) = .787, p < .05. The results of the correlation analysis are presented in Table 3.

Table 3. Correlation between Organizational Culture Dimension and Solar PV Adoption

Organizational Culture Dimension	**Solar PV Adoption Sub-constructs**			**Solar PV Total Constructs**
Analysis Method	Affordability	Accessibility	Enabling Environment	Solar PV Total
Pearson Correlation	.585**	.677**	.787**	.817**
Sig. (2-tailed)	<.001	<.001	<.001	<.001
N	152	152	152	152

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

Regression Analysis

Regression analysis demonstrated the relationship between organizational culture (independent variable) and solar PV adoption (dependent variable). Based on the multiple regression model, the study sought to determine the influence of organizational culture on solar PV adoption in Climate Smart Agriculture (CSA) in Uasin Gishu County, Kenya.

Regression Model Summary for Organizational Culture Dimension

The results in Table 5 show that organization culture explained a considerable proportion of the variance in the adoption of solar PV technology in Climate Smart Agriculture (CSA) in UG (R^2 = .668). This means 67% of variations in solar PV adoption could be influenced by organizational culture, while 33% of the variation was accounted for by the residuals and any other factors that may influence the variance.

Table 5. Model Summary for Organizational Culture Dimension

Model	**R**	**R Square**	**Adjusted R Square**	**Std Error of Estimate**
1	.817[a]	.668	.665	12.83830

a. Predictors: (Constant), Organization Culture
b. Dependent Variable: Solar PV adoption

Analysis of Variance for Organizational Culture Dimension

The result of the regression ANOVA was significant, F (1, 150) = 301.372, $p < .05$, implying a significant relationship between the dependent variable and at least one of the independent variables. The findings in Table 6 indicate that organization culture significantly influences solar PV adoption in Climate Smart Agriculture (CSA) in UG County.

Table 6. Regression ANOVA for Organizational Culture Dimension

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	49672.702	1	46972.702	301.372	<.001[b]
Residual	24723.298	150	164.822		
Total	74396.000	151			

a. Dependent Variable: Solar PV adoption
b. Predictors: (Constant), Organizational Culture

Regression Results

Table 7 presents the study findings. As shown, the organization culture significantly predicted solar PV adoption in Climate Agriculture (CSA) in UG County {β = 1.686, t *(152)* = 17.360, $p < .05$}. The results implied that a unit improvement in organizational culture would lead to an improvement of 1.686 in solar PV adoption.

Table 7. Regression Coefficient for Organizational Culture Dimension

Model		Unstandardized Coefficients		Standard. Coefficients	t	Sig.
		B	**Std Error**	**Beta**		
	(Constant)	35.326	3.235		10.920	<.001
	Organization Culture	1.686	.097	.817	17.360	<.001

a. Dependent Variable: Solar PV adoption

The study also considered the moderating influence of Stakeholder Perceptions on the relationship between organizational culture and the adoption of solar PV in Uasin Gishu County. The results in Table 8 show that stakeholder perceptions caused a variation of 81.1% in solar PV adoption in moderating the relationship between organization culture and solar PV adoption.

Table 8. Regression Model Summary after Moderation

Model	R	R Square	Adjusted R Square	Std Error of Estimate
1	.900[a]	.811	.807	9.75735

a. Predictors: (Constant), Stakeholder perceptions, Organizational culture, Moderating Composite.
b. Dependent Variable: Solar PV adoption

ANOVA for Organizational Culture and Solar PV Adoption after Moderation

The analysis of variance after moderation showed that the model used in linking Stakeholder perceptions to solar PV adoption was statistically significant, F (3, 148) = 211.141, $p < .05$. The significance p-value was lower than the conventional probability of 0.05 significance level ($p \leq .05$) set for this study. The results demonstrate that the overall model significantly associated stakeholder perceptions, organizational culture, and solar PV adoption. The findings also indicated that stakeholder perceptions were a good predictor of organizational culture and solar PV adoption in Uasin Gishu County.

Table 9. Regression ANOVA for Organizational Culture and Solar PV Adoption after Moderation

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	60305.535	3	20101.845	211.141	<.001[b]
Residual	14090.465	148	95.206		
Total	74396.000	151			

a. Dependent Variable: Solar PV adoption

b. Predictors: (Constant), Stakeholder perceptions, Moderating Composite, Organizational culture

Regression Coefficient for Organizational Culture and Solar PV Adoption after Moderation

The results in Table 9 show that organization culture significantly predicted solar PV {β = -.314, t *(152)* = -1.542, $p < .05$}. The results imply that an increase in organizational culture led to a decrease in solar PV adoption. Further, findings show that stakeholder perceptions had a moderating influence on the relationship between organizational culture and solar PV adoption in UG County {β = -.707, t (152) = -.4.934, $p < .05$}.

Table 9. Regression Coefficients for Organizational Culture and Solar PV Adoption after Moderation

Model		Unstandardized Coefficients		Standard. Coefficient	t	Sig.
		B	**Std Error**	**Beta**		
	(Constant)	81.123	6.780		11.964	<.001
	Organizational Culture	-.314	.203	-.152	-1.542	.125
	Moderating Composite	.005	.001	1.529	9.285	<.001
	Stakeholder perceptions	-.707	.143	-.541	-4.934	<.001

a. Dependent Variable: Solar PV adoption

Discussion

The results show that organizational culture influences the adoption of solar PV in CSA UG County {r (152) = .817, $p < .05$}. These results are supported by Dasgupta and Gupta (2019), who opined that internal organizational culture must be receptive to innovative technologies before introducing new technology. Their study found that cultural values were antecedents

to the acceptance of recent technologies in emerging economies like India. The results also revealed that organizational culture was strongly associated with solar PV adoption, χ^2 (2456, N = 152) = 2422.525, p < .05. This finding concurred with that of Metz et al. (2020), wherein it was observed that organizations with a strong culture anchored on a robust core value system and customer orientation had a positive effect on customer service effectiveness for sustainability and adoption of renewable energy technologies.

The ANOVA results indicated that no significant differences were identified within and between the groups among the demographic variables. The findings are supported by Shah et al. (2021), who showed that a green psychological climate, green organizational culture, and sustainable environmental efficiency positively affected green HR management. The findings also resonate with Shao (2019), who indicated that a flexible and adaptive organizational culture positively affected the relationship between strategic leadership and business strategic alignment, while a rigid and controlled cultural environment had a negative effect.

Regression results indicated that organizational culture significantly predicted solar PV adoption, with 67% of the changes explained by the organizational culture dimension of strategic leadership. The results also showed that the organizational culture dimension positively predicted solar PV adoption. Van Dun and Kumar (2021) found that it was necessary to adopt transformational leadership that influences organizational culture for industry employees to accept and adopt 4.0 technologies. The findings indicated that an increase in organizational culture dimension would increase solar PV adoption in UG County by 1.686 units, thus implying that the organizational culture elements in transformational leadership are significant for the adoption of technology such as solar PV.

In terms of the moderating influence of stakeholder perceptions on the relationship between organizational culture and solar PV adoption in Uasin Gishu County, Kenya, the Chi-Square test found that the two variables were strongly associated, χ^2 (3618, N = 152) = 3751.939, p < .05. At the same time, ANOVA did not reveal any significant differences in the means for solar PV adoption across all demographic variables for the stakeholder perceptions. Regression results, however, indicated that stakeholder perceptions did not significantly moderate the relationship between organizational culture {R^2 = .811, F (3,148) = 211.141, p < .05; β = -.314, p < .05}. Kukal and Irmak (2018) showed that stakeholder perceptions of the effect of climate variability on agricultural production indicated that crop yields fell below 25% of the national average due to climate change. However, Mitter et al. (2019) indicated that farmer acceptance of climate change reality was slow and based on local conditions that influenced their behavioral attitudes based on socio-environmental and cognitive interpretation of climate information. Stakeholder risk perceptions of climate change were supported by studies by Chowdhury et al. (2020; Chandel et al., 2022).

Conclusion

The study findings revealed that the organizational culture dimension of strategic leadership significantly affected solar PV adoption in Uasin Gishu County, Kenya. Thus, the hypothesis that the organizational culture dimension of strategic leadership had no significant influence on solar PV adoption in Uasin Gishu County, Kenya, was rejected. Regression results indicated that the changes in solar PV adoption could be explained by the organizational culture dimension of strategic leadership and confirmed that the organizational culture dimension was a good predictor of solar PV adoption. It was thus concluded that organizational culture dimension elements, such as supporting and implementing a green

supply chain management system, developing a green stakeholder behavior protocol, and aligning organizational culture to support solar adoption, were important for the success of solar PV adoption efforts in UG County. Based on the finding that the organizational culture dimension of strategic leadership significantly influenced solar PV adoption in Climate Smart Agriculture in Uasin Gishu County, the study recommends that the Uasin Gishu County leadership promote a culture that recognizes climate change as a global phenomenon recognized by the United Nations (UN) organization through SDG goals by promoting an organization culture that ensures that adequate staff engagement for support and alignment.

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