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ABSTRACT:
The solar power industry in Nairobi, Kenya, has grown significantly in recent years but faces challenges such as high operational costs, inefficient supply chain management, and limited financing access. This study aimed to establish the effects of strategic responses, specifically digital transformation strategies, on the performance of solar power enterprises in Nairobi County. The research was anchored on the Technology Acceptance Model (TAM) and employed a descriptive survey design, targeting managerial personnel in firms licensed by the Ministry of Energy. Given the relatively small population size, a census approach was used, covering all 187 operational solar energy firms in Nairobi County. Data collection was conducted using self-administered questionnaires, and analysis was performed using qualitative content analysis and statistical methods via SPSS version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were utilized, while inferential methods such as Chi-Square, Contingency Coefficient Measure of Association, ANOVA, and Multiple Linear Regression tested variable relationships. The findings revealed that digital transformation strategies significantly impacted the performance of solar power enterprises, with a regression coefficient of β=0.196 and a p-value of 0.041. These strategies improved operational efficiency, reduced costs, and enhanced customer engagement. The study highlighted the critical role of strategic management practices in ensuring the success and sustainability of solar power enterprises in Nairobi.

***Keywords**: Digital Transformation Strategies, Organizational Performance, Solar Power Enterprises*

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BACKGROUND OF THE STUDY

The solar power industry has experienced significant growth globally, driven by increasing awareness of environmental concerns, declining costs of solar technology, and government incentives for renewable energy adoption (International Energy Agency, 2021). In Africa, solar energy presents immense potential to address energy poverty, expand access to electricity in rural areas, and drive economic development (African Development Bank Group, 2020). Kenya has emerged as a leader in renewable energy development in Africa, with a growing focus on solar power as a key pillar of its energy mix (Kenya Renewable Energy Association, 2023).

The solar power enterprises in Nairobi, Kenya, have seen significant strategic responses aimed at harnessing the region's abundant solar energy potential to meet the country's growing electricity needs and strategic goals (Ministry of Energy, 2022). However, the industry faces various challenges that require strategic responses to navigate effectively, including market competition, regulatory changes, technological advancements, and environmental factors (Odongo et al., 2020). Understanding the background of this problem requires a thorough examination of the strategic landscape of Nairobi's solar energy industry, including the challenges faced by companies, existing strategic responses, and their effectiveness in driving performance outcomes (Mangla & Anand, 2018).

Statement of the Problem

The solar power industry in Nairobi, Kenya is experiencing rapid growth, with a fourfold increase in installed solar capacity from 50 MW in 2015 to over 200 MW in 2020 (Kenya Renewable Energy Association, 2022). However, the industry faces challenges such as policy and regulatory instability, restricted access to finances, and market competition. To navigate these challenges, solar power enterprises in Nairobi need to adopt digital transformation strategies to improve their performance. Digital transformation can help solar power enterprises to increase efficiency, reduce costs, and enhance customer engagement (Bharadwaj et al., 2013). However, there is a paucity of research on the strategic responses of solar power enterprises in Nairobi, particularly in relation to digital transformation. Existing literature focuses on broader renewable energy trends or specific aspects of solar energy policy and technology adoption, leaving a research gap on the impact of digital transformation strategies on the performance of solar power enterprises in Nairobi, Kenya (Oliver et al., 2001; Munir et al., 2011; Mutua et al., 2010; Mwithiga et al., 2013).

General objective

The main objective of the study was to establish the effects of Strategic Responses on Performance of Solar Power Enterprises in Nairobi, Kenya.

Specific Objectives

To determine the effect of digital transformation strategies on the performance of solar power enterprises in Nairobi, Kenya.

Technology Acceptance Model (TAM) Theory

The Technology Acceptance Model (TAM), proposed by Davis (1989), explains technology adoption based on perceived usefulness (belief in improved performance) and perceived ease of use (belief in minimal effort required). In Nairobi's solar sector, TAM enhances efficiency, cost reduction, and customer satisfaction (Kamau et al., 2019). Njoroge et al. (2020) emphasized that highlighting the benefits of new technologies, such as smart grids, increases adoption. Mwangi et al. (2018) stressed user-friendly systems and training as key to improving customer confidence and engagement. Integrating TAM into strategic planning enables firms to adapt to market trends and technological changes, improving business performance (Wambui et al., 2021).

Conceptual Framework

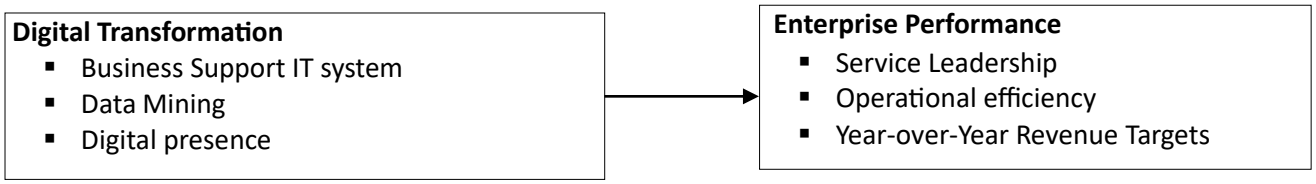

Figure 1: Conceptual Framework

Research Gap

The growth of solar enterprises in Nairobi, Kenya has created a research gap on the strategic responses and performance of these entities. Current literature focuses on broader renewable energy trends, solar energy policy, and technology adoption, with limited attention to the specific challenges faced by solar power enterprises (International Energy Agency, 2021; African Development Bank Group, 2022). Scholars have explored strategic responses in non-solar contexts (Oliver et al., 2001; Munir et al., 2011; Mutua et al., 2010; Mwithiga et al., 2013), but there is a lack of research on digital transformation strategies and their effect on the performance of solar power enterprises in Nairobi, Kenya.

METHODOLOGY

Research Design

This study adopted a quantitative research design, rooted in logical positivism, to examine the relationship between digital transformation and the performance of solar power enterprises in Nairobi, Kenya. A quantitative approach was chosen for its ability to analyze large datasets, produce objective numeric data, and provide accurate measurements (Simon, 2007; Patton, 2002). This design allowed for the collection of numerical data through survey methods, which is suitable for exploratory studies with a clearly defined population (Christensen et al., 2011).

Target Population

The study targeted solar energy enterprises in Nairobi County, Kenya, that were involved in assembling, producing, and distributing solar energy equipment. According to the Kenyan Ministry of Energy's 2021 Energy Survey, renewable energy accounted for 89% of electricity generation, with solar energy contributing 1% (GOK, 2021). There were 187 registered businesses specializing in renewable energy solutions in the county. The study focused on management personnel in these enterprises, who play a crucial role in strategic planning and operational implementation.

Table 1: Target Population

Serial	Types of Energy Firms	Totals Number of Firms: Target Population
1.	Assembly	24
2.	Distributions	163
	Total	**187**

The study used primary data collected through a research questionnaire to analyze the relationship between strategic responses and organizational performance in solar energy companies in Nairobi, Kenya. The data analysis involved calculating descriptive statistics, frequencies, percentages, means, and standard deviations. A regression model was used to investigate the correlation between the variables, and the coefficient of determination was used to ascertain the proportion of alterations in organizational performance linked to strategic responses.

The regression model was:

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \mu$

X2 = Digital transformation strategies;

The study also performed diagnostic tests to confirm alignment with Ordinary Least Squares (OLS) assumptions, including tests for multicollinearity, homoscedasticity, and normality of the dependent variable. The data was presented using visual aids such as charts, graphs, and maps to make the data more easily understood. The study interpreted the research findings from the evidence presented by the data collected.

FINDINGS AND DISCUSSIONS

Response Rate

One hundred and eighty-seven questionnaires were handed out to registered businesses specialized in supplying renewable energy solutions in Kenya. From the 187 questionnaires distributed the study received 173 of them having been filled to satisfactory levels. The questionnaires returned added up to 92.5% response rate that was taken to be excellent. This is because according Mugenda and Mugenda (2013), research achieves a response good enough to proceed with when it attains a 50% response rate, it is sufficient when it is at 60% any response above 70% is considered excellent. Posting 92.5% response rate the study's response can be employed in the realization of other goals such as reporting.

Digital Transformation Strategies

To obtain information about the second independent variable Digital Transformation Strategies, numerous statements were asked and the respondents required to provide feedback on a likert scale of one (1) to five (5), for 1 being strongly disagree, 2 being disagree, 3 being neither agree nor disagree, 4 being agree and 5 being strongly agree to the statements. On the statement "Use of Information Technology and Internet has significantly improved our Solar firm's performance" 15.1% strongly disagreed to the statement, 13.9% of the respondents disagreed to the statement, 35.5% of the respondents neither agreed nor disagreed to the statement, 24.7% of the respondents agreed to the statement whereas 10.8% of the respondents strongly agreed to the statement, with a mean of 3.02 and standard deviation 1.195.

On the statement "The adoption of IT/ digitization impacted reduced our operational costs." 13.5% strongly disagreed to the statement, 8.8% of the respondents disagreed to the statement, 10.8% of the respondents neither agreed nor disagreed to the statement, 43.8% of the respondents agreed to the statement whereas 24.1% of the respondents strongly agreed to the statement, with a mean of 3.54 and standard deviation 1.306. On the statement "Data mining activities provide valuable insights that drive decision-making in our organization", 5.2% strongly disagreed to the statement, 23.9% of the respondents disagreed to the statement, 19.1% of the respondents neither agreed nor disagreed to the statement, 20.7% of the respondents agreed to the statement whereas 31.1% of the respondents strongly agreed to the statement, with a mean of 3.49 and standard deviation 1.291.

Regarding the statement "We continuously improve how we deliver to increase operational efficiency.", 4.8% strongly disagreed to the statement, 15.9% of the respondents disagreed to the statement, 7.6% of the respondents neither agreed nor disagreed to the statement, 47.0% of the respondents agreed to the statement whereas 24.7% of the respondents strongly agreed to the statement, with a mean of 3.71 and standard deviation 1.145. On the statement "Investments in enhancing our digital presence (social media) have positively impacted our sales and customer engagement." 4.8% strongly disagreed to the statement, 29.9% disagreed to the statement, and 5.2% of the respondents neither agreed nor disagreed to the statement, 41.8% of the respondents agreed to the statement whereas 18.3% of the respondents strongly agreed to the statement, with a mean of 3.39 and standard deviation 1.223.

Table 2: Digital Transformation Strategies Frequencies

Digital Transformation Strategies	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean	Std. Dev.
Use of Information Technology and Internet has significantly improved our Solar firm's performance.	15.1	13.9	35.5	24.7	10.8	3.02	1.195
The adoption of IT/ digitization impacted reduced our operational costs.	13.5	8.8	10.8	43.8	24.1	3.54	1.306
Data mining activities provide valuable insights that drive decision-making in our organization.	5.2	23.9	19.1	20.7	31.1	3.49	1.291
We continuously improve how we deliver to increase operational efficiency.	4.8	15.9	7.6	47.0	24.7	3.71	1.145
Investments in enhancing our digital presence (social media) have positively impacted our sales and customer engagement.	4.8	29.9	5.2	41.8	18.3	3.39	1.223

Organization Performance

To obtain information about the dependent variable, Organization Performance, various statements were asked and the respondents required to provide feedback on a likert scale of one (1) to five (5), for 1 being strongly disagree, 2 being disagree, 3 being neither agree nor disagree, 4 being agree and 5 being strongly agree to the statements. On the statement "We met performance goals over the past year." 10.4% of the respondents neither agreed nor disagreed to the statement, 64.9% of the respondents agreed to the statement whereas 24.7% of the respondents strongly agreed to the statement, with a mean of 4.14 and standard deviation 0.3376.

On the statement "Adopted strategies have led to increased efficiency in our operations", 5.6% strongly disagreed to the statement, and 16.7% of the respondents neither agreed nor disagreed to the statement, 37.0% of the respondents agreed to the statement whereas 20.7% of the respondents strongly agreed to the statement, with a mean of 3.87 and standard deviation 0.929. Regarding the statement "We provide adequate support and resources to staff for service delivery", 2.0% strongly disagreed to the statement, 13.1% disagreed to the statement 21.5% of the respondents neither agreed nor disagreed to the statement, 49.4% of the respondents agreed to the statement whereas 13.9% of the respondents strongly agreed to the statement, with a mean of 3.60 and standard deviation 0.951.

On the statement "Adopted strategies has led to high performing team", 2.8% strongly disagreed to the statement, 12.4% of the respondents neither agreed nor disagreed to the statement, 40.6% of the respondents agreed to the statement whereas 44.2% of the respondents strongly agreed to the statement, with a mean of 4.24 and standard deviation 0.874. On the statement "Efficient processes have made operations better" 2.8% strongly disagreed to the statement, 22.7% of the respondents neither agreed nor disagreed to the statement, 47.0% of the respondents agreed to the statement whereas 27.5% of the respondents strongly agreed to the statement, with a mean of 3.96 and standard deviation 0.869.

Table 3: Organization Performance

Organization Performance	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean	Std. Dev.
We met performance goals over the past year.	-	-	10.4	64.9	24.7	4.14	0.3376
Adopted strategies have led to increased efficiency in our operations	5.6	-	16.7	337.0	20.7	3.87	0.929
We provide adequate support and resources to staff for service delivery	2.0	13.1	21.5	49.4	13.9	3.60	0.951
Adopted strategies has led to high performing team.	2.8	-	12.4	40.6	44.2	4.24	0.874
Efficient processes have made operations better.	2.8	-	22.7	47.0	27.5	3.96	0.869

Inferential Statistics

Regression analysis was performed to find out the degree of relationship between the variables and the contribution of independent variable towards the dependent variable.

Regression Analysis

Model Summary

According to the results presented in Table 4, the value of R square is 0.877. This shows that 87.7% difference in financial performance can be credited to these changes in Digital Transformation Strategies. The remaining 12.3% suggests other factors exist that are helpful in explaining variation in Organization Performance excluded in this study.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706[a]	.498	.468	.133767

a. Predictors: (Constant), Digital Transformation Strategies

Analysis of Variance

From the findings in Table 5, the significance of 0.000 is below the chosen significance level of 0.05, meaning it can be considered significant. These results prove that the F-calculated value (16.344) was above the F-critical value (F=3.896); this insinuates that Digital Transformation Strategies can be used to predict Organization Performance.

Table 5: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.308	1	1.308	39.636	.000[b]
	Residual	5.676	172	.033		
	Total	6.984	173			

a. Dependent Variable: Organization Performance

b. Predictors: (Constant), Digital Transformation Strategies

Regression Coefficients of the Study Variables

This regression equation model was used to fit the regression coefficient.

$Y= \beta 0+ \beta_1 X_1 + \varepsilon$. Where, Y= Organization Performance, β_0= constant (coefficient of intercept), X_1= Digital Transformation Strategies, ε = error term.

From the findings presented in table 6 below, the following regression equation was fitted.

Multiple regressions

Y= 1.347 + 0.196 X

Observing the equations, it can be noted that when all other variables remain at constant zero, a constant value of 1.347 was held by the Organization Performance.

The results depict Digital Transformation Strategies has great effect on Organization Performance (β=0.196, p=0.000). The outcomes went ahead to suggest that Digital Transformation Strategies have positive influence on financial well being. These results show that Digital Transformation Strategies positively and significantly influence financial wellbeing. Meaning, a unit rise in Digital Transformation Strategies will leads to a rise in Organization Performance by 0.196 units. Johnson and Clark (2021) highlight that efficient Digital Transformation Strategies contributes to financial stability and profitability by optimizing resource allocation and reducing inefficiencies.

Table 6: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.347	0.258		5.221	.000
	Digital Transformation Strategies	0.196	0.077	0.226	2.545	.000

a. Dependent Variable: Organization Performance

CONCLUSION AND RECOMMENDATIONS

The statistically significant p-value of 0.041 further validates the positive impact of digital transformation strategies. It confirms that the relationship between digital transformation and strategic responses is not a random occurrence, but rather a meaningful connection. This highlights the importance of continuous digital innovation for solar power enterprises aiming to maintain competitive advantage and achieve long-term sustainability. Digital solutions such as automation, online customer engagement, and advanced analytics are critical for enhancing business agility and operational scalability in the industry.

Overall, the conclusion drawn from this study points to the undeniable value of digital transformation for solar power enterprises in Nairobi. As the energy sector becomes increasingly technology-driven, businesses that invest in digital capabilities was better positioned to seize opportunities, manage risks, and maintain growth. In a competitive and evolving landscape, digital transformation is not just an operational improvement it is a strategic imperative for the success and resilience of solar enterprises.

It is recommended that Solar Power Enterprises in Nairobi, Kenya prioritize the implementation of robust Digital Transformation Strategies practices. This includes conducting regular assessments to evaluate resource allocation and utilization, ensuring that financial, human, physical, and technological assets are deployed effectively. Organizations should invest in training and capacity-building programs for staff to enhance their skills in strategic Digital Transformation Strategies.

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