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Influence of Cost Resource Planning on Implementation Outputs of Greenhouse Projects in Trans-Nzoia County, Kenya

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Abstract

Implementation of greenhouse projects has recently, attracted the attention of government agents. The concern is attributed to the failure rate among investors in the greenhouse projects. Therefore, this study sought to determine the influence of cost resource planning on implementation of greenhouse projects in five sub counties in Trans-Nzoia County. This study was guided by Control Theory. This study adopted descriptive survey design. The target population was 394 and the sample size of 118 respondents was used. Data was collected using questionnaires and interview schedules. Data was analyzed using descriptive and inferential statistics and presented using tables and graphs. Cost resource planning positively and significantly impacted the implementation outcomes of greenhouse projects (β=0.213; $p<0.05$). Interview schedule results show that cost resource planning assisted greenhouse farmers to allocate resources to the projects at the time. The study concludes the cost resource planning is a critical component in greenhouse project implementation. The study suggests that the Ministry of Agriculture should ensure the provision of sufficient extension officers to support greenhouse projects, focusing on effective project cost resource planning for the successful implementation.

Key words: *Cost Resource Planning, Implementation Outputs & Greenhouse Projects*

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1.0 Introduction

1.1 Background of the study

Successfully implementing greenhouse projects in the horticultural sector depends on effective cost resource planning, which directly influences implementation outcomes. Cost resource planning involves financial forecasting, budgeting, resource allocation, and cost control measures to ensure that projects are executed efficiently within budgetary constraints. The ability to manage costs effectively enhances project feasibility, minimizes financial risks, and ensures timely completion. Various factors, including organizational culture, leadership, cross-functional integration, training, communication, and technology, play a crucial role in shaping the implementation outcomes of greenhouse projects (Moons, Daems, & Van de Velde, 2021). However, without a structured approach to cost resource planning, projects often experience financial inefficiencies that result in delays and cost overruns (Moons, De Pelsmacker, Pijnenburg, Daems, & Van de Velde, 2022).

Globally, many greenhouse projects have suffered from poor cost resource planning, leading to significant delays and financial shortfalls that negatively affect implementation outputs (Pijnenburg, Daems, & Van de Velde, 2022). Cost overruns and underestimations of financial needs are key factors contributing to project failures, emphasizing the necessity for structured cost planning and control throughout the project lifecycle (Simanjuntak & Agung, 2018). Previous research has identified challenges such as inadequate budget allocation, inefficient cost monitoring, price fluctuations of materials, and delays in procurement as major threats to project execution (Morakinyo, Okunola, Ogunrayewa, & Dada, 2015). These financial challenges affect the availability of essential resources, leading to stalled projects, increased operational costs, and diminished project outcomes.

The consequences of poor cost resource planning extend beyond financial constraints, impacting the overall efficiency and quality of greenhouse projects. Delays often result in higher costs due to accumulating loan interest rates, inflation, pressure from clients (sponsors), and potential legal disputes over contractual obligations (Osazuwad, 2010). According to Smith (2011), large-scale greenhouse projects require precise financial planning, effective communication with stakeholders, and accurate forecasting of resource needs to avoid unnecessary expenditures and inefficiencies. Without proper cost control mechanisms, projects may suffer from resource mismanagement, resulting in compromised quality, reduced productivity, or, in extreme cases, project abandonment (Arogo, 2015).

Given these challenges, this study evaluates the influence of cost resource planning on the implementation outputs of greenhouse projects. The research aims to assess how budgeting, financial monitoring, and risk mitigation strategies affect project success. By understanding the relationship between cost resource planning and implementation outcomes, this study provides insights into improving financial management practices to enhance efficiency, sustainability, and overall project success in the greenhouse sector.

1.2 Statement of the Problem

Effective cost resource planning is fundamental to the successful implementation of greenhouse project outputs, as it ensures optimal allocation and utilization of financial resources. Poor cost planning often results in budget overruns, time delays, and

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compromised project quality, ultimately hindering the achievement of intended outcomes (Jong, Vignetti, & Pancotti, 2019). Despite the growing recognition of greenhouse projects in enhancing food security and sustainable agriculture, many initiatives encounter financial setbacks due to weak cost management strategies (Rahman et al., 2022). Proper financial forecasting, budget controls, and expenditure tracking are essential in mitigating cost-related risks and enhancing efficiency (Kerzner, 2017). However, greenhouse projects in Trans-Nzoia County continue to face implementation challenges due to inadequate cost management, leading to stalled or incomplete initiatives. Limited research exists on the direct influence of cost resource planning on greenhouse project implementation outputs, creating a critical knowledge gap. This study seeks to bridge this gap by examining how cost resource planning impact the successful execution of greenhouse projects in Trans-Nzoia County, Kenya.

1.3 Research Objective

To assess the influence of cost resource planning on implementation outputs of greenhouse projects in Trans-Nzoia County, Kenya.

1.4 Research Hypothesis

H_0: There is no statistical significant relationship between cost resource planning influence and implementation outputs of greenhouse projects in Trans-Nzoia County, Kenya.

2.0 Literature review

2.1 Control Theory

This study is underpinned by Control Theory, a framework developed by Ouchi (1979) and Eisenhardt (1985), which provides a structured approach to cost resource planning by ensuring that financial management practices align with project objectives. The theory is based on the premise that controllers (e.g., project managers) and controlees (e.g., project teams) often have differing interests, necessitating the use of control mechanisms to maintain cost efficiency and prevent financial mismanagement (Widl et al., 2018). These control mechanisms can be categorized into formal and informal types. Formal controls include behaviour control, which enforces financial procedures, budgeting rules, and accountability structures, and outcome control, which ties financial rewards or consequences to project milestones and cost efficiency. Informal controls encompass clan control, which fosters a cost-conscious culture through shared values and team collaboration, and self-control, which encourages individual responsibility in cost management through empowerment and financial decision-making autonomy (Luthaus, 2012).

In the context of greenhouse project implementation, effective cost resource planning requires well-defined financial frameworks, precise cost estimation, budgeting discipline, and rigorous expenditure monitoring. Without appropriate cost controls, greenhouse projects risk budget overruns, delays, and suboptimal outputs (Jong, Vignetti, & Pancotti, 2019). Control Theory highlights the importance of structured financial oversight, clear task division, and strategic delegation of financial responsibilities to project administrators (Gersup, 2010). Unlike rigid bureaucratic approaches, Control Theory emphasizes adaptability in response to dynamic project environments, ensuring that cost planning mechanisms remain flexible and responsive to challenges (Pinto & Covin, 2013). By integrating control mechanisms tailored to financial planning, this study explores how cost resource management strategies

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influence the successful implementation of greenhouse projects, particularly in Trans-Nzoia County, Kenya.

2.2 Resource Planning and implementation output of greenhouse Projects

Resource planning, often referred to as Enterprise Resource Planning (ERP), is a business management technique essential for identifying the resources needed to complete a project successfully (Chofreh, Goni, & Klemes, 2017). A well-executed resource plan enables individuals to determine the necessary labor, materials, and equipment required for project completion. This plan summarizes the resource levels needed and impacts project sustainability (Mellor, Hao, & Zhang, 2014). Additionally, a detailed resource plan facilitates obtaining approval from sponsors, aids in budgeting and forecasting, and supports project sustainability (Kahvandi, Saghatforoush, Mahoud, & Preece, 2019).

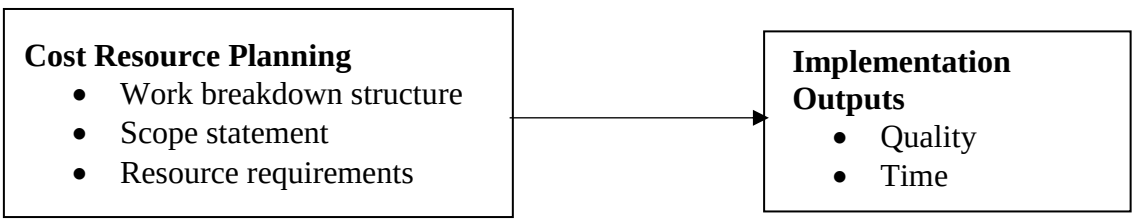
Funding, as defined by Cordova, Dolci, and Gianfrate (2015), refers to providing financial resources to support a need, program, or project. Generally, 'funding' is used when internal reserves are used, while 'financing' applies to external or borrowed funds. Financial shortages are a major challenge and can create a cycle of difficulties, especially when managing cash flow and raising additional funds becomes problematic. Raising substantial funds often requires significant effort, and many organizations struggle with fundraising.

Chan, Darko, Olanipekun, and Ameyaw (2018) note that financing issues, design changes, delays in contractor payments, and inadequate greenhouse management are key causes of delays in greenhouse projects. They argue that investments in facilities represent short-term costs that yield long-term benefits. Consequently, owners must secure capital to cover initial costs.

Effective resource planning, encompassing financial, human, and material resources, is crucial for successful greenhouse project implementation. Daud et al. (2018) stress that comprehensive resource planning ensures the availability and efficient use of all necessary components, reducing the risk of delays and cost overruns. Aligning resource planning with environmental sustainability goals is also important. Abid et al. (2019) note that incorporating sustainable practices, such as energy-efficient technologies and water conservation, enhances long-term project viability.

Conceptual framework

Independent Variables **Dependent Variable**



3.0 Materials and methods

3.1 Research Design

A descriptive survey design was chosen for this study because it allows for the collection of data from a broad population, which makes it impractical to directly observe the characteristics of each individual. Descriptive research focuses on

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identifying and detailing the current state of phenomena and aims to outline behaviours, attitudes, values, and characteristics (Creswell & Creswell, 2017).

3.2 Target Population

The study aimed to include all greenhouse farmers and agricultural officers working for the Ministry of Agriculture. Specifically, the researcher focused on 334 greenhouse farmers and 60 agricultural extension officers from the Ministry of Agriculture in Trans-Nzoia County.

In this study, data were collected from farmers using a stratified simple random sampling technique and from agricultural extension officers using purposive sampling across the five sub-counties of Trans Nzoia County: Cherengany, Kwanza, Saboti, Endebess, and Kiminini.

Cooper and Schindler (2003) suggest that for statistical generalization, a sample should include at least 30 elements. Similarly, Kothari (2004) notes that a sample comprising about 10% of the population can provide reliable data if chosen correctly. Given the high homogeneity within the different strata, the study included 30% of the target projects.

Table 1 Sample size

Category of respondents	Population	30% of population	Sample size
Green House Farmers	334	30% X 334 = 100	100
Agricultural extension officers	60	30% X 60 = 18	18
TOTAL	**394**	**30%X 394 = 118**	**118**

Source: Researcher (2024)

The study comprised a total of 118 participants. To gather data, a stratified simple random sampling method was employed to select 100 greenhouse farmers, while purposive sampling was used to choose 18 agricultural extension officers. This method ensured that every individual in the population had an equal chance of being selected. It guarantees that each person or item has the same probability of being chosen in each sampling round (Bhardwaj, 2019). Key informants were chosen from each of the five sub-counties in Trans-Nzoia County, with the 18 extension officers selected based on the extensive area of the sub-counties and their significant experience in the greenhouse sector.

3.4 Methods of Data Collection

Data was collected using questionnaires and interview schedules. Data collection from farmers was conducted using questionnaires. The data collected was quantitative, meaning it was measured numerically rather than described in natural language (Mwatha, Muema, & Munyoki, 2017). They are particularly suitable for this research because they facilitate the collection of data from a diverse group while maintaining confidentiality, saving time, and reducing bias due to their structured paper format (Ranney et al., 2015). Data were gathered from agricultural extension officers using interview schedules. According to Mohajan (2018), individuals often prefer oral communication over written forms and are likely to offer more comprehensive and candid responses during interviews compared to questionnaires.

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3.5 Data Analysis Procedures

The quantitative data collected from the questionnaires underwent initial processing, including validation, coding, and tabulation, to prepare it for analysis using the Statistical Package for the Social Sciences (SPSS). This software served as a tool for analysing data related to the study's objectives. Both quantitative and qualitative analysis techniques were employed. Qualitative data gathered from in-depth interviews with agricultural professionals were analyzed thematically. This involved transcribing the data, organizing it into categories and themes, and presenting it in prose form with direct quotes from participants, aligned with the study's themes and objectives. Narrative analysis was used to interpret these data. The results were presented through tables, figures, and graphs to provide a clear and systematic record of the findings.

4.0 Results and discussion

4.1 Cost resource planning

The primary objective of this study was to determine how cost resource planning affects the implementation outcomes of greenhouse projects in Trans-Nzoia County, Kenya. Results are shown in Table 2.

Table 2 Descriptive Statistics on Recruitment and Selection Practices

		SD	D	UD	A	SA	Mean	Std. Dev
There is working breakdown structure on the greenhouse projects.	F	10	25	0	30	30	3.47	1.435
	%	10.5	26.3	0.0	31.6	31.6	69.4	
Delays exist when implementing annual work plan structure sometimes.	F	6	0	1	24	64	4.47	1.019
	%	6.3	0.0	1.1	25.3	67.4	89.5	
All the resources required in the greenhouse like water, pesticides are readily available.	F	5	16	9	20	45	3.88	1.312
	%	5.3	16.8	9.5	21.1	47.4	77.7	
Availability of labour force needed to work in the greenhouse is not a challenge.	F	0	1	2	36	56	4.55	.597
	%	0.0	1.1	2.1	37.9	58.9	90.9	
Ability to acquire desired planting seeds and seedlings is not a challenge.	F	3	1	2	42	47	4.36	.849
	%	3.2	1.1	2.1	44.2	49.5	87.2	
Resource mobilization for planting and harvesting is well planned for every season.	F	4	18	13	25	35	3.73	1.259
	%	4.2	18.9	13.7	26.3	36.8	74.5	
There are no major changes in resource planning since established structures are used for decades.	F	5	4	3	37	46	4.21	1.061
	%	5.3	4.2	3.2	38.9	48.4	84.2	
Cost resource planning is useful for implementing greenhouse projects.	F	3	0	9	33	50	4.34	.895
	%	3.2	0.0	9.5	34.7	52.6	86.7	

Sources: Research Data (2025)

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The study results in Table 2 presents the descriptive statistics regarding the influence of cost resource planning on the implementation outcomes of greenhouse projects. The study found that 63.2% of the respondents agreed, while 36.8% disagreed, that there is an effective work breakdown structure in place for these projects. Additionally, 69.4% of respondents (mean=3.47, StdDev=1.453) believed that a functional work breakdown structure exists for greenhouse projects, and a plan outlining procedures to guide farming activities was established.

Regarding delays in greenhouse projects, the majority of respondents (92.6%) agreed, 1.1% were undecided, and 6.3% disagreed that delays sometimes occur during the implementation of the annual work plan. The findings indicated that 89.5% of respondents (mean=4.47, StdDev=1.019) acknowledged the existence of project delays during the execution of annual work plans. These findings align with Smith (2011), who emphasized that large greenhouse projects are inherently complex and require thorough planning to mitigate frequent and severe delays.

In terms of resource availability, 68.5% of respondents agreed, 9.5% were undecided, and 22.1% disagreed that essential resources such as water and pesticides are readily available for greenhouse projects. The study revealed that 77.7% of respondents (mean=3.88, StdDev=1.312) agreed that these resources are accessible. The availability of resources is crucial, as the success of greenhouse projects depends on a steady supply of water to sustain plant life and pesticides to control diseases.

The respondents' views on the availability of labor force indicated that the majority, 97.8%, agreed, 2.1% were undecided, and 1.1% disagreed, suggesting that the availability of labor for greenhouse work is not a significant issue. The study's findings revealed that 90.9% of respondents concurred (mean = 4.55, Std Dev = 0.597) that labor force availability is not a challenge, likely due to the high unemployment rates in society. These findings align with the study by Shade and Jacobson (2015), which highlights that, despite the economic uncertainty of unpaid internships, young people express a strong desire for meaningful, stable, and paid employment.

Regarding the ability to acquire desired planting seeds and seedlings, 93.6% of respondents agreed, 2.1% were undecided, and 4.3% disagreed that obtaining these resources is not a challenge. The study found that 87.2% of respondents accepted this (mean = 4.36, Std Dev = 0.849), noting that seeds and seedlings are readily available in the market, though prices tend to fluctuate.

When asked about resource mobilization for planting and harvesting, 63.2% agreed, 13.7% were undecided, and 23.1% disagreed that resource mobilization is well-planned each season. The findings revealed that 74.5% of respondents (mean = 3.73, Std Dev = 1.259) believed resource mobilization is adequately planned. Additionally, when asked about changes in resource planning, 87.3% agreed, 3.2% were undecided, and 9.5% disagreed, indicating that there are minimal changes in resource planning due to the use of long-established structures. The study found that 84.2% of respondents (mean = 4.21, Std Dev = 1.061) agreed that resource planning remains consistent over time, a finding consistent with Burchi et al. (2018), who noted that greenhouse projects often follow a master plan that includes longstanding structures and configurations.

Regarding cost resource planning for greenhouse projects, 87.3% of respondents agreed, 9.5% were undecided, and 3.2% disagreed that it is a valuable tool for implementation. The study revealed that 86.7% of respondents (mean = 4.34, Std Dev = 0.895) supported

the usefulness of cost resource planning. This aligns with Mellor, Hao, and Zhang (2014), who emphasized the importance of a cost resource management plan in identifying the necessary resources to successfully complete a project. Effective resource planning helps determine the required labor, materials, and equipment, contributing to the sustainability and successful completion of projects..

During interview schedules, respondents highlighted the significance of cost resource planning in the successful implementation of greenhouse projects. They noted that it assists farmers in allocating resources appropriately and helps identify available resources across different regions. One respondent mentioned that "Cost resource planning helps farmers/stakeholders identify the various resources present in different regions of the country." Additionally, it aids in conserving non-renewable resources and reducing waste. The main challenges affecting resource planning in projects include poor objectives, unrealistic expectations, limited resources, poor communication, scheduling delays, and lack of transparency in the planning process.

4.2 Correlation Analysis

Correlation is a statistical measure that indicates the strength of the relationship between two variables, with values ranging from -1 to +1. A coefficient of -1.000 denotes a perfect negative correlation, while a coefficient from +0.001 to +1.000 represents a perfect positive correlation. A coefficient of 0.000 signifies no relationship between the variables (Orodho, 2013). Table 3 present the results.

Table 3 Correlation Analysis

		Cost resource planning	**Implementation output of greenhouse projects**
Cost resource planning	Pearson Correlation	1	.650**
	Sig. (2-tailed)		.000
Implementation output of greenhouse projects	Pearson Correlation	.650**	1
	Sig. (2-tailed)	.000	
	N	95	95

** *Correlation is significant at the 0. 01 level (2-tailed)*

Source: ***Survey Data (2025)***

The results, presented in Table 3, demonstrate that cost resource planning has a significant positive impact on the implementation results of greenhouse projects, with a correlation of ($r=0.650$; $p<0.05$). This suggests that effective cost resource planning is crucial for assembling the resources necessary for the success of greenhouse projects. It plays a key role in identifying the comprehensive resources needed to achieve project goals.

These findings are consistent with Kahvandi et al. (2019), who highlight that a project resource management plan is essential for pinpointing the total resources required for a successful project. A well-utilized resource plan helps in determining the amount of labor, resources, and equipment needed to execute the project. Such a plan summarizes

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the resource levels necessary for project completion and influences project sustainability. When documented accurately, it details the specific labor, resources, and equipment required for effective project implementation.

4.3 Assessing the Fit of the Model Summary

Analysis of variance was employed to assess the suitability of the multiple regression model for the data. As presented in Table 4, the results revealed that the effect of the dependent variable was statistically significant ($F=39.558$; $p<0.05$). This suggests that the regression model was appropriate for the data.

Table 4 ANOVA Test Results

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.669	4	4.417	39.558	.000[b]
	Residual	10.050	90	.112		
	Total	27.719	94			

a. Dependent Variable: Cost control

b. Predictors: (Constant), Cost resource planning

4.4 Regression coefficients

A T-test was used to assess the statistical significance of each regression coefficient to determine the beta (β) values, which indicate the strength of each independent variable's impact on the dependent variable. The results, displayed in Table 5, show the regression coefficients for the study variables. The findings indicated that cost resource planning significantly and positively affected the implementation outputs of greenhouse projects ($\beta=0.213$; $p<0.05$).

Table 4.18: Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.028	.282		3.645	.000
Cost resource planning	.213	.065	.282	3.287	.001

The results can be interpreted as with constant cost resource planning, the implementation output of greenhouse projects was 1.028 units. The coefficient of 0.213 suggests that a one-unit enhancement in cost resource planning leads to a 0.213-unit increase in greenhouse project implementation output.

4.5 Hypothesis Testing

Pearson correlation analysis was employed to assess research variable relationships. The hypothesis was evaluated, where a p-value below 0.05 indicated a significant relationship between the variables, leading to the rejection of the null hypotheses. Conversely, a p-value above 0.05 suggested no significant relationship, resulting in the retention of the null hypotheses. The results are detailed in Table 5.

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Table 5 Hypothesis Table

Hypotheses	β and P values	Decision rule(accept/reject)
H_{01}: There is no statistically significant relationship between the cost resource planning and implementation output of greenhouse projects.	β_1=0.213; P=0.000<0.05	Rejected the null hypothesis

The initial hypothesis (H01) proposed that there is no statistical significant relationship between cost resource planning and the implementation outcomes of greenhouse projects. However, as demonstrated in Table 5, the results supported the alternative hypothesis, revealing a statistically significant relationship between cost resource planning and implementation outcomes (β1=0.213; p=0.001<0.05). The β coefficient of 0.213 suggests that cost resource planning accounts for 21.3% of the variation in the implementation outcomes of greenhouse projects. The p-value of 0.000, which is below the threshold of 0.05, indicates that cost resource planning has a positive and statistically significant impact on the implementation outcomes of greenhouse projects in Trans-Nzoia County, Kenya.

5.0 Conclusions and recommendations

Cost resource planning is useful for implementing greenhouse projects because it helps to efficiently identify and allocate various resources assigned to the projects at the right time. The availability of labour force needed to work in the greenhouse was not a challenge. All the resources required in the greenhouse like water, pesticides are readily available and also delays exist when implementing annual work plan structure sometimes. Therefore cost resource planning has significant influences on assembling resources that builds the foundation of any successful greenhouse projects.

5.1 Recommendations

The ministry of agriculture should employ adequate extension officers that visit all the greenhouse projects and educate stakeholders, farmers and employees on the cost management practices so as to improve on successful implementation of the greenhouse projects.

5.2 Suggested Areas of Further Study

The study aimed to evaluate the impact of cost management on the implementation outcomes of greenhouse projects in Trans-Nzoia County, Kenya. It also recommends that future research explore the challenges associated with cost management in the implementation of greenhouse projects across all counties in Kenya and in other regions globally.

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