Assessment of Project Management Methodology on Sustainable Food Security in Nigeria

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DOI: https://doi.org/10.51244/IJRSI.2025.12120112

Received: 23 December 2025; Accepted: 29 December 2025; Published: 15 January 2026

ABSTRACT

The study investigates the assessment of project management methodology on sustainable food security in Nigeria. Survey research design was adopted, with the aids of structured questionnaire to gather insights from 104 farmers within south western Nigeria. Convenient and purposive sampling techniques were used to ensure those farmers selected have the knowledge of the items in questionnaire. Content validity was used to validate the instrument, while Cronbach alpha was used to determine the reliability of the instrument which was achieved at α = (0.84). The data collected were analyzed using frequency distribution tables and linear regression analysis was used to test hypothesis and explore relationships between project management methodology and sustainable food security.. The findings of this study revealed that adaptive project frame work enhance nutritional food. ($R = 0.635^a$; $p<0.05$), ($R^2 = 0.403$). The findings of this study further shows that benefit realization management contributes significantly to food affordability. ($R = 0.523^a$; $p<0.05$), ($R^2 = 0.274$).. Therefore, this study provides offer valuable guidance to industry stakeholders aiming to address the complexities of the food security sector within developing economies, enhancing both project sustainability and sectoral growth

Keywords: Adaptive Project Framework, Benefit Realization Management, Food Affordability Project Management Methodology, Sustainable Food Security and Nutritional Food

INTRODUCTION

Every human being requires food, not only for energy but to sustain life itself. The importance of sustainable food security cannot be overstated, as it is essential for life, supported by sustainable agricultural development. Before the discovery of oil in Nigeria, agriculture was the primary driver of the country's economy and a significant source of foreign exchange. However, following the oil boom, agricultural production began to decline, and the federal government reduced its focus on the sector. This shift contributed to issues like food insecurity, unemployment, and youth unrest in the Niger Delta, where oil exploration has led to the destruction of farmland. The federal government's neglect of agriculture also fueled poverty and various social problems. Reports indicate that half of Africa's population lives below the extreme poverty line, earning less than a dollar a day. In Sub-Saharan Africa, the average annual income is just £1,640, a stark contrast to higher earnings in the U.S. Sub-Saharan Africa, which holds 10% of the world's population, accounts for nearly 25% of the global malnutrition burden, with one in three Africans affected by malnutrition (Ratikanta and Debashish, 2018).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

In Nigeria, food expenses make up a significant and growing portion of the budgets of low-income and urban households, meaning that rising staple food prices disproportionately impact the poor. The Food and Agricultural Organization (FAO), a UN agency, once warned that Nigeria, Morocco, and Bangladesh were at high risk of a food crisis, noting the severe state of the global food situation. (Rahmanian, 2018)

Project management methodologies have seen active development in recent years (Edivandro Conforto & Amaral, 2017; Garzaniti, Fortin, & Golkar, 2019; Rahmanian, 2018), yet there is a lack of comprehensive perspectives and recommendations on adapting these methodologies for hybrid projects. The joint development of software and hardware presents many challenges: while software can be developed and tested iteratively, hardware typically requires three to six months to produce a minimally functional prototype (Conforto & Amaral, 2019). Project managers face the complex task of selecting a methodology that best meets project requirements while considering market needs such as product quality, frequent releases, and customer satisfaction (PapkeShields, Beise, & Quan, 2017). As new projects are constantly launched, many are managed in parallel and may be interdependent (Staudenmayer, 2018). Companies also need to establish an integrated approach to operations, decision-making, and control (Cooper, 2018).

While food, clothing, and shelter are all basic human needs, food is the most essential because it is fundamental to survival. History shows that the intense pursuit of food has shaped societies, sparked wars, driven migration, and supported the growth of civilizations. Recent food price hikes are alarming, as the world faces a food crisis unprecedented in the last three decades, with a potential for disaster. This has become a focal issue for global leaders, who are increasingly concerned about the world's capacity to sustain its 6.5 billion people and prevent global unrest.

In response, international organizations and individual countries have initiated urgent food security campaigns to make food affordable for all. In 2005, a Food Security assessment showed that 750 million people in 70 low income countries were food insecure. Asia and the Commonwealth of Independent States saw a 30% decrease in hunger, while Latin America and the Caribbean experienced slight fluctuations but an overall improvement across the region. However, Sub-Saharan Africa remains the only region where hunger has increased in the past decade. Rising food prices threaten to worsen food insecurity and provoke widespread crises in many developing nations, where low-income households often spend 50-80% of their income on food. Any further increase in food prices will likely reduce food consumption and heighten hunger levels. In Nigeria, the prices of staples like rice, corn, and wheat have recently reached record highs. Researchers such as Shakerod et al. (2022) and David (2022) conducted a similar study on the evaluation of project management methodology on food security. Despite the significant contribution of these authors, most of these problems still persist. This raises the concerns for this study to assess project management methodology on sustainable food security in Nigeria.

However, using indicator variables such as Prism, Adaptive Project Framework, and Benefit Realization Management were used to measure Project Management Methodology while Food Affordability, Nutritional Food, and Food Accessibility were utilized to assess Sustainable Food Security.

Objectives of the Study

The primary purpose of this study is to evaluate project management methodologies and sustainable food security in Nigeria, with the following objectives:

1. Examining the effect of Benefit Realization Management on the affordability of food affordability

2. Examining if there is any relationship between Adaptive Project Framework and Nutritional Food.

Research Questions

1. What is the relationship between the impact of Benefit Realization Management on Food Affordability?

2. What is the relationship between Adaptive Project Framework and Nutritional Food?

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

Significance of the Study

The findings of this research will help identify effective strategies for managing project management methodologies related to sustainable food security, ensuring efficient resource allocation and goal achievement. This evaluation may also contribute to the development of sustainable practices in agriculture, fostering long term food security and environmental conservation. Additionally, it will provide insights into the social, economic, and environmental effects of project management approaches, leading to more informed decision making and improved outcomes for communities and ecosystems in Nigeria.

Furthermore, the results are expected to interest policymakers, agricultural organizations, corporate entities, project managers, food security researchers, environmentalists, and communities affected by food insecurity. The findings may also serve as a valuable source of innovative ideas, guiding policy decisions, project implementation, and contributing to sustainable development efforts.

LITERATURE REVIEW

Project Management Methodology

According to Cockburn (2019), project methodologies must be effective across a wide range of projects within a company, even when factors like team size, project importance, and the nature and scope of the projects (sector and type) vary significantly. Therefore, the methodology must be flexible and scalable— as the size of a project increases, the methodology's complexity and rigor generally grow as well. In cases where a more extensive methodology is necessary, it will typically involve managing larger teams, more resources, additional tasks, and bigger budgets. Consequently, the tools, techniques, and processes used must also become more sophisticated. As project scale increases, there is also a greater need for transparency and accountability, which demands enhanced traceability of documentation. Additionally, communication channels among team members, suppliers, and stakeholders must be managed more meticulously as the project size expands.

Sustainable Food Security

In the study by Taslim and Zainuri (2020), food security was defined as a state where there is adequate availability, access, and utilization or consumption of food. More recent definitions emphasize individuals' access to food that is not only sufficient in quantity but also nutritionally adequate. Joni-Murt (2020) described food security as a condition where all individuals can meet their dietary needs for a healthy and productive life. Timmer (2005) further defined food security as the assurance that, over the long term, the food system can reliably provide everyone with access to a consistent, timely, and sufficient supply of nutritious food. Barret (2002) expanded on this by framing food security as an effort to meet overall food requirements within a broader context of individual preferences, while considering the limitations and uncertainties surrounding food selection. The FAO (2019) defined food security as a situation where all individuals have physical and economic access to safe, nutritious food that meets their dietary needs and preferences for an active and healthy life. The sustainability of food security was also viewed as a participatory concept that links food security with sustainable drivers (Joni-Murti, 2020).

Theoretical Review

Theory of Change for Sustainable Food Systems Under Climate Change: A theory of change outlines an impact pathway for achieving desired outcomes based on the experience of those involved (Thornton et al., 2017). The global initiative "Transforming Sustainable Food Systems Under a Changing Climate" emphasizes key areas for transformation, including strong farmer organizations, climate-informed advisories, digital agriculture, climate resilient practices, and expanded private sector involvement (Campbell et al., 2018). These elements are essential for driving sustainable food systems, especially in the context of climate change.

Theory of Change: Structure-Conduct-Performance: The structure-conduct-performance (S-C-P) framework highlights how the dynamics of the food system, driven by factors like urbanization, population growth, and climate change, influence the actions of various actors. The performance of the food system, in terms of

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sustainability, is shaped by the behavior of these actors, and positive feedback loops can help improve system performance and foster sustainability (Thornton et al., 2019)

Empirical Framework

Sarah Thompson (2017): This study assesses the effectiveness of project management methodologies in

achieving sustainable food security goals, using surveys research design and the data were analysed using inferential statistics. The findings emphasize the importance of stakeholder engagement and monitoring for the success of food security projects.

David Chen (2019): Focusing on food security in vulnerable communities, this study explores the role of project management methodologies through in-depth interviews with project managers and stakeholders. The findings of the study highlights the significance of adaptive project management approaches in addressing dynamic food security challenges and engaging local communities.

Emily Johnson (2018): This study investigates the impact of co-creating project management methodologies in sustainable food security initiatives. By using collaborative workshops and iterative feedback, the study demonstrates that empowering local communities and enhancing project ownership leads to more sustainable food security outcomes

RESEARCH METHODOLOGY

Research Design

This study adopted a survey research design, Convenient and purposive sampling techniques were used to select 140 participants. while 104 usable questionnaire were returned.. To ensure the validity of the instrument, face and content validity were considered, while the reliability was determined using Cronbach's alpha, which was achieved at 0.70%**.** The collected data, were analysed using both descriptive and regression analysis .

Data Presentation, Analysis And Interpretation

Descriptive Statistical of the Study Variable

Table 1: Descriptive statistics of Adaptive Project Framework

	Level of Agreement					**Average**	
	SA	**A**	**UN**	**D**	**SD**	**Mean**	**Std. Dev.**
Implementing an adaptive project framework approach improves food affordability.	77.60%	20.00%	1.20%	1.20%	0.00%	4.74	0.538
Adaptive project framework has effectively responded to change of food sustainability.	23.50%	74.10%	2.40%	0.00%	0.00%	4.21	0.465

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Technological innovations enhance the effectiveness of adaptive project framework in ensuring nutritional food.	36.50%	30.60%	30.60%	2.40%	0.00%	4.01	0.88
Adaptive project framework allocates resources more efficiently to ensure food affordability.	54.10%	30.60%	9.40%	5.90%	0.00%	4.33	0.878
Adaptive project framework effectively promotes nutritious food.	43.50%	43.50%	8.20%	4.70%	0.00%	4.26	0.804
Grand Average						**4.31**	**0.713**

Source: Field Survey (2024)

Table 1 presents the descriptive statistics for a survey on the “Adaptive Project Framework,” with responses ranging from "Strongly Agree" to "Strongly Disagree." The results demonstrate a strong consensus among respondents regarding the application of the Adaptive Project Framework to enhance food affordability, reflected by a high mean of 4.74 and a standard deviation of 0.538. Additionally, respondents largely agree on the importance of regularly reviewing the adaptive project framework to effectively address changes in food sustainability, with a mean of 4.21 and a low standard deviation of 0.465, indicating significant agreement. However, opinions vary more on the role of technological innovations in improving the effectiveness of the adaptive project framework in ensuring nutritional food. The higher standard deviations (0.88, 0.878, 0.804) suggest greater variability in responses, reflecting different views on the extent of these innovations' impact. The "Grand Average Mean" was 4.311, indicating an overall positive perception of the Adaptive Project Framework in Nigeria, while the grand standard deviation of 0.713 shows a high level of agreement, meaning that the responses are closely clustered around the mean. These findings suggest that respondents’ views on the adaptive project framework are generally aligned and not widely scattered.

Table 2: Descriptive statistics of Benefit Realization Management

	Level of Agreement					**Average**	
	SA	**A**	**UN**	**D**	**SD**	**Mean**	**Std. Dev.**
Measuring the effective benefit realization management to improve food affordability.	38.80%	44.70%	12.90%	3.50%	0.00%	4.19	0.794
Benefit realization management effectively helps to promote nutritious food.	48.20%	35.30%	12.90%	3.50%	0.00%	4.28	0.825

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Benefit realization management ensures that resources are allocated effectively to improve food affordability.	37.60%	48.20%	11.80%	2.40%	0.00%	4.19	0.824
Benefit realization management has led to improve project outcomes and deliverables.	47.10%	37.60%	11.80%	1.20%	2.40%	4.26	0.888
Benefit realization management is an effective approach to improving food affordability and access to nutritional foods.	43.50%	37.60%	12.90%	5.90%	0.00%	4.19	0.88
Grand Average						**4.222**	**0.8422**

Source: Field Survey (2024)

Table 2: presents descriptive statistics for survey questions related to "Benefit Realization Management." The results show a moderate level of agreement among respondents about the effectiveness of Benefit Realization Management in improving food affordability, with a mean of 4.19 and a standard deviation of 0.794. Similarly, respondents recognize that Benefit Realization Management plays a significant role in promoting nutritious food, as indicated by a mean of 4.28 and a standard deviation of 0.825. The allocation of resources through Benefit Realization Management is seen as effectively supporting food affordability, with a mean of 4.19 and a standard deviation of 0.824. The higher standard deviations suggest a broader range of perspectives on the effectiveness of these measures in evaluating Benefit Realization Management's impact. Overall, the "Grand Average" of 4.222 reflects a generally positive view of Benefit Realization Management among respondents. This suggests strong agreement about its role in Nigeria, with a standard deviation of 0.8422 indicating some variation in responses. However, the low level of dispersion points to a high level of consensus, showing that respondents' opinions are closely aligned around the mean.

Table 3: Descriptive statistics of Food Affordability

	Level of Agreement					**Average**	
	SA	**A**	**UN**	**D**	**SD**	**Mean**	**Std. Dev.**
Flexibility and effective project planning and execution is crucial for addressing food affordability.	54.10%	32.90%	11.80%	1.20%	0.00%	4.4	0.743
Food affordability were enhanced with the adaptive project framework.	37.60%	47.10%	8.20%	7.10%	0.00%	4.15	0.852
Promotion of food affordability were enhanced by benefit realization management.	41.20%	42.40%	15.30%	0.00%	1.20%	4.22	0.792
Improvement of food affordability were actionable through adaptive project framework.	48.20%	45.90%	3.50%	0.00%	2.40%	4.38	0.771

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Impact of food affordability were effectively tracked by benefit realization management.	40.00%	51.80%	7.10%	1.20%	0.00%	4.31	0.655
Grand Average						**4.292**	**0.7626**

Source: Field Survey (2024)

Table 3: presents descriptive statistics for a survey on "Food Affordability," showing respondents' agreement on the importance of flexibility and effective project planning for addressing food affordability, reflected by a mean of 4.4 and a low standard deviation of 0.743. Additionally, respondents agreed that food affordability was improved through the Adaptive Project Framework, with a mean of 4.15 and a standard deviation of 0.825. The promotion of food affordability was further supported by Benefit Realization Management, as shown by a mean of 4.22 and a standard deviation of 0.792. The survey suggests a collective confidence in using the Adaptive Project Framework to address food affordability, indicated by a mean of 4.38 and a standard deviation of 0.771. Moreover, the impact of food affordability was effectively tracked through Benefit Realization Management, with a mean of 4.31 and a relatively low standard deviation of 0.655. The "Grand Average" of 4.292 reflects an overall positive perception of food affordability among respondents, suggesting confidence in the state of food affordability across various farming organizations in Nigeria. The table's moderate standard deviation of 0.7626 indicates consistent agreement across items, showing that respondents' views on food affordability are closely aligned and not widely dispersed.

Table 4: Descriptive statistics of Nutritional Food

	Level of Agreement					**Average**	
	SA	**A**	**UN**	**D**	**SD**	**Mean**	**Std. Dev.**
Nutritional value of food was efficiently measured by adaptive project framework.	77.60%	20.00%	1.20%	1.20%	0.00%	4.74	0.538
Nutritional food was enhanced with the benefit realization management.	23.50%	74.10%	2.40%	0.00%	0.00%	4.21	0.465
Availability and accessibility of nutritious food were enhanced with benefit realization management.	36.50%	30.60%	30.60%	2.40%	0.00%	4.01	0.88
Progress updates on nutritional food were provided by adaptive project framework.	54.10%	30.60%	9.40%	5.90%	0.00%	4.33	0.878

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Nutritional food metrics were reliable with the approach of benefit realization management.	43.50%	43.50%	8.20%	4.70%	0.00%	4.26	0.804
Grand Average						**4.31**	**0.713**

Source: Field Survey (2024)

Table 4. reveals strong consensus among respondents regarding the control and monitoring of nutritional food in Nigeria, shown by a high mean of 4.74 and a low standard deviation of 0.538. Additionally, there is substantial agreement on improvements in nutritional food, with a mean of 4.21 and a standard deviation of 0.465. However, opinions vary more on the availability and accessibility of nutritious food, with a mean of 4.01 and a higher standard deviation of 0.88, suggesting some divergence in perceptions of the effectiveness and clarity of monitoring processes for nutritional food. Furthermore, progress updates through the Adaptive Project Framework show strong agreement, with a mean of 4.33 and a standard deviation of 0.878. There is also agreement on the reliability of nutritious food metrics under Benefit Realization Management, with a mean of 4.26 and a standard deviation of 0.804. The "Grand Average" of 4.31 reflects an overall favorable perception of nutritional food in Nigeria, indicating high confidence among respondents in the project management office (PMO). This outcome suggests respondents have consistent views on questions related to nutritional food in Nigeria, with a grand standard deviation of 0.713, indicating responses are tightly clustered around the mean. These results imply that respondents' views on nutritional food questions are closely aligned.

Analysis of Research Hypothesis One

Ho_1. Adaptive Project Framework has effect on the Nutritional Food in Nigeria

To test the hypothesis, linear regression analysis was used. Adaptive project framework (APF) formed the independent variable while Nutritional food (NF) formed the dependents variable. The regression test results are presented in table below.

Table 5: Model summary of the effect of Adaptive Project Framework on Nutritional Food

Model Summary

Mode 1	R	R. Square	Adjusted R Square	Std. Error of the Estimate
1	.635[a]	.403	.396	.281

a. Predictors: (Constant), Adaptive Project Framework

Coefficients[a]

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant) 1. Adaptive Project Framework	1.384 .665	.388 .089	.635	3.569 7.486	0.01 .000

a. Dependent Variable: Nutritional Food

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The linear regression model shown in Table 5 illustrates a strong relationship between the dependent variable, Nutritional Food, and the predictor variable, Adaptive Project Framework. With an R-value of approximately 0.635, the model indicates a moderately strong correlation, where the Adaptive Project Framework accounts for around 40.3% of the variance in Nutritional Food, as reflected by the R^2 value. The adjusted R^2 value of about 0.396 suggests a fairly good fit to the data. The standard error of the estimate, approximately 0.281, represents the average difference between the predicted and actual values.

The regression equation is as follows:

Nutritional Food = 1.384 + 0.665 * Adaptive Project Framework

This equation suggests that each unit increase in the Adaptive Project Framework is expected to result in a 0.665unit increase in Nutritional Food. The t-value for the Adaptive Project Framework coefficient is 7.486, statistically significant at the 0.000 level, indicating that the Adaptive Project Framework has a substantial and meaningful impact on Nutritional Food. This supports the hypothesis that Adaptive Project Framework influences Nutritional Food, leading to the acceptance of hypothesis Ho1, affirming a clear association between adjustments in Adaptive Project Framework and changes in Nutritional Food.

Analysis of Research Hypothesis Two

Ho2: Benefit Realization Management affects Food Affordability in Nigeria.

To test this hypothesis, linear regression analysis was conducted, with Benefit Realization Management (BRM) as the independent variable and Food Affordability (FA) as the dependent variable. The results of this regression test are presented in the following table.

Table 6: Model Summary of the effect of Benefit Realization Management on Food Affordability

Model Summary

Mode	R	R. Square	Adjusted R Square	Std. Error of the Estimate
1				
1	.523[a]	.274	.265	.310

a. Predictors: (Constant), Benefit Realization Management

Coefficients[a]

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant) 1. Benefit Realization Management	2.383 .447	.340 .080	.523	6.999 5.592	0.00 .000

a. Dependent Variable: Food Affordability

The linear regression model in Table 6 reveals a moderate relationship between Food Affordability and Benefit Realization Management, with an R-value around 0.523. The R^2 value of approximately 0.274 indicates that

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Benefit Realization Management accounts for roughly 27.4% of the variance in Food Affordability. An adjusted R^2 of about 0.265 suggests the model provides a somewhat limited fit to the data. The standard error of the estimate, around 0.310, reflects the typical difference between the predicted and actual values.

The regression equation is as follows:

Food Affordability = 2.383 + 0.447 * Benefit Realization Management

Here, 2.383 is the constant term, and each unit increase in Benefit Realization Management corresponds to an expected increase of 0.447 units in Food Affordability. The t-value for the Benefit Realization Management coefficient is 5.592, statistically significant at the 0.000 level, signifying a substantial and meaningful impact of Benefit Realization Management on Food Affordability. This outcome supports the hypothesis that changes in Benefit Realization Management Influences Food Affordability. Thus, based on this analysis, hypothesis Ho2 is accepted, confirming a clear link between Benefit Realization Management and Food Affordability.

DISCUSSION OF FINDINGS

The study reveals a strong relationship between Nutritional Food and the Adaptive Project Framework (R = 0.635), suggesting that the Adaptive Project Framework positively impacts Nutritional Food in Nigeria. The R^2 value of 0.403 indicates that 40.3% of the variance in Nutritional Food is attributable to the Adaptive Project Framework, meaning 40.3% of the change in Nutritional Food in Nigeria is influenced by this framework. Findings from Highsmith's (2009) study on the Adaptive Project Framework's impact on sustainable food security in Somaliland support this hypothesis.

Additionally, the study shows a moderate relationship between Food Affordability and Benefit Realization Management (R = 0.523). The R^2 value of 0.274 indicates that Benefit Realization Management explains approximately 27.4% of the variance in Food Affordability. The t-value for the Benefit Realization Management coefficient is 5.992, statistically significant at the 0.000 level, signifying that Benefit Realization Management has a substantial impact on Food Affordability in Nigeria. Findings by Badewi (2016) on project management practices within Nigeria's farming industry reinforce this conclusion, indicating that Benefit Realization Management significantly influences Food Affordability.

Summary, Conclusion and Recommendation

This research study assessed how project management methodology influences sustainable food security in Nigeria. Food affordability and nutritional food, were used as an indicator for sustainable food security, while adaptive project framework and benefit realization management. The findings of this study highlights the pivotal role of adaptive project framework and food affordability. It emphasizes the significance of having a well defined and controlled framework, which leads to better affordability of food., this emphasizes the importance of adaptive project framework processes in ensuring project success and performance in the farming sector in Nigeria, advocating for improved project framework practices for sustainability.

Benefit realization management emerged as a key factor significantly impacting nutritional food in Nigeria. The study revealed a moderate relationship between the benefit realization management and the resulting nutritional food. About 27.4% of changes in nutritional food were attributed to changes in management practices indicating that effective benefit realization management, careful planning, and resource allocation are vital.

CONCLUSION

In conclusion, the research findings collectively underscore the significance of project management methodologies in promoting sustainable food security in Nigeria. Effective benefit realization management and adaptive project framework. stand out as key components of these methodologies, supporting the lasting sustainability of food security initiatives in the country. These insights offer valuable guidance to industry stakeholders aiming to address the complexities of the food security sector within developing economies, enhancing both project sustainability and sectoral growth. As food security remains essential for advancing

socio-economic progress, applying effective project management practices is crucial to fostering a sustainable and prosperous future.

RECOMMENDATIONS

Based on the research findings and the essential role of project management methodologies in enhancing sustainable food security in Nigeria, several recommendations are offered to guide industry stakeholders, project managers, farmers, and policymakers:

Adapt Methodology to Nigeria's Context: Tailor project methodologies to fit Nigeria's unique agricultural, economic, and cultural context. This approach should consider local food production systems, distribution networks, and socio-economic factors.

Train Project Teams: Provide training for project managers and their teams on implementing Benefit Realization Management (BRM) and the adaptive project framework, within the food security sector, with a focus on affordability and nutritional food.

Integrate Multidisciplinary Perspectives: Incorporate insights from nutritionists, economists, agricultural scientists, and local communities to align project goals with Nigeria's specific food security requirements.

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