

**Public participation and sustainability of foreign-funded water projects in South Sudan.
A cross-sectional case study of the Juba town block urban water supply project.**

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Abstract

Background.

Public participation is widely recognized as a key factor in ensuring the sustainability of foreign-funded water projects. This study examined the relationship between public participation in project planning, implementation, and monitoring, and the sustainability of water sources in Juba Town Block.

Methodology.

A cross-sectional study design was adopted, utilizing both quantitative and qualitative approaches. Respondents, including community members, water board officials, and technical staff, were purposively and randomly selected. Data were collected through structured questionnaires, interviews, focus group discussions, and observation checklists. Quantitative data were analyzed using descriptive statistics, Pearson correlation, and regression analysis, while qualitative data were thematically analyzed.

Results.

The study found that 66% of respondents were male, and the majority were aged 26–30 years. Spring wells were the most common water source (50%). Results indicated that water sources were generally functional (70%) and effectively used (76%), but faced challenges such as inadequate equipment, limited accountability, and insufficient public involvement in work plans and budgeting. Correlation analysis revealed a strong positive relationship between public participation and sustainability: planning ($r = 0.539$, $p < 0.01$), implementation ($r = 0.595$, $p < 0.01$), and monitoring ($r = 0.764$, $p < 0.01$). Regression analysis further showed that participation in monitoring (Beta = 0.730, $p < 0.001$) was the strongest predictor of sustainability, while planning and implementation were not significant predictors.

Conclusion:

Public participation, particularly in monitoring, is critical for ensuring the sustainability of water sources. Limited involvement in planning and implementation hinders project effectiveness and responsiveness to community needs.

Recommendations:

Efforts should focus on enhancing public engagement in monitoring and evaluation activities, ensuring transparent accountability mechanisms, and providing sufficient equipment and resources to support community participation, thereby improving the long-term sustainability of water projects in Juba Town Block.

Keywords: Public participation, sustainability, water sources, project monitoring, Juba Town Block, South Sudan.

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Background

Public participation ensures effective utilization of resources, improved accountability to communities, responsiveness to local needs, increases equitable access, quality, and better performance (Pauline 2023). According to Salum (2022), the sustainability of local development Sources relies heavily on Public participation. In South Sudan, the water sector development has been encouraged to adopt Public participation models to achieve access to safe and clean water for all” (NWP, 2022; Cinara, 2022; MWE, 2023).

The government and donors in South Sudan have influenced public participation in planning, implementation, and monitoring of foreign-funded water Sources through a variety of avenues, like the use of public-driven demand approaches and civil society funding. “For instance, in FY2022/2024, the Government of South Sudan allocated 100 USD billion for civil society organizations working in the water sub-sector” (MoFPED Budget framework 2022/2023). “Despite all these attempts, sustainability of foreign-funded water Sources remains a serious challenge for local communities. For example, by June 2022, the

national access to safe water in the rural areas remained at 44% against the projected national average of 88%” (Juba Eye 21, 2023) and the level of sustainability in accessing the said water sources is low where it is indicated that 20% of the water sources are not in use two years after installation. A report by the Ministry of Water and environment (MWE) (2022) indicated that about 40 percent of water connections made by 2021 to homes were not operational and supplying water by 2022, of which more than 50% of the faults was due to lack of maintenance by users, and others were vandalized due to ongoing road constructions of buildings and roads and these threatens the sustainability of the projects. “Poor access to clean water is blamed on inadequate public participation in planning, implementation, and monitoring because people do not take good care, maintenance, and ownership after the water project implementers leave. If nothing is done, it is feared that 1.5 million South Sudanese who live in urban areas might die of water-borne diseases because of a lack of clean water. This study, therefore, seeks to examine the relationship between public participation and the sustainability of foreign-funded water Sources in South Sudan.

Methodology

Table 1: Study Population and Sampling Techniques.

Population category	Total	Sampling Size	Sampling Techniques
Juba Town block Officials	10	10	Purposive
Water Board Members	04	04	Purposive
Water technical team	06	03	Purposive
Selected Water Users	180	115	Simple random
Total	200	132	

Source: Juba City records (2023).

The categories of participants were selected from different departments involved in water program planning, implementation, and monitoring. These included Juba Town block Officials, Water Board Members, Water technical team, and selected water users.

Sampling techniques

In this study, both random and purposive sampling techniques were employed, where random sampling included simple random sampling. Simple random sampling was used in the Public survey because it offers a high degree of representation of all the categories under study. Purposive sampling is justified in situations where respondents with vital information are few.

Research design

“A cross-sectional study design was adopted for this research because it enables and facilitates the collection of data at a single point in time”. In addition, the study adopted a triangulation of both quantitative and qualitative approaches for data collection and analysis.

Study population.

The study population included top officials in the Juba Block council who were involved in handling Public and water project issues, and public members were also included in the research. 10 Juba Town Block council officials involved in foreign-funded water Sources. “There were 4 water board members who oversee water-related activities and 6 water technical team members whose role is to provide maintenance and operation of water facilities” (Juba Town Block, Human Resource Record 2021). The entire population in which this study was drawn included 2000 people, from whom samples of 132 respondents were selected.

Sample size, selection, and procedure

The sample size was determined using Krejcie and Morgan’s statistical table, which is recommended by Amin (2021).

Study methods

The data collection methods involved key informants’ interviews, questioning, focus group discussions, and an observation checklist.

Interviews

The method of interviews will be used to collect information from the key top Juba Town Block officials, who include the following staff: the chief administrative officer, Town Block water officer, Town Block health inspector, Town Block Public development officer, pump mechanics, secretary for works and technical services. The information supplied by key informants was triangulated by the information supplied by the members of the technical team and the Public.

Survey method.

This was used to collect quantitative data that is in line with study objectives and will be used to collect data from members of the Public and water user committees. During the survey, a closed questionnaire was used to collect data.

Questionnaires were used to collect in-depth information from the water user committees and the Public.

Pretesting (Validity and Reliability) of the research instrument

Validity

Content validity index was used to measure the extent to which the content of the instruments corresponds to the content of the conceptual framework of the study. Amin (2022) recommends that “an instrument which has an average index of 0.7 or above is accepted as being valid”. The researcher therefore measured the content validity by;

- a) Ensuring that the contents in the key informant guide conform to the conceptual framework
- . b) engaging research experts and research supervisors to evaluate the relevance and clarity of the questions
- , c) Field testing of focus group discussions on 3 groups, each from a parish, and observation of foreign-funded water Sources. Content validity was then measured by the formula: $CVI = \frac{\text{Total number of items rated to be valid}}{\text{Total number of items in the instruments}}$.

Data collection instruments

These included: interview guide, focus group discussion guide, and observation checklist.

Interview guide.

Structured interviews were conducted with both individuals and groups. This was administered to communities that have access to safe water. This method is suitable because it gives room for probing based on the responses from the respondents. Interviews give more clarity and yield the biggest response rate. This kind of data collection gives room for flexibility during the investigation for the researcher.

Questionnaire.

Table 2: Content validity index.

Variables	Content validity index	Number of items
Participation in Planning	0.875	8
Participation in Implementation	0.75	8
Participation in Monitoring the Sustainability of Foreign-Funded Water Sources	0.9375	8

Source: Primary data.

Results in Table 2 show that all variables had a content validity index that was above 0.7. This shows that the instruments were valid for the study.

An instrument is treated as reliable when it is able to measure what it is intended to measure. A pre-test was carried out by the researcher on respondents who are not part of the study. It is from this pre-test that the researcher judged that the data collection tool was reliable, as it would enable the researcher to estimate the error.

Reliability

Table 3 results from reliability tests

Cronbach's Alpha	N of Items
.947	37

Source: Primary data (2016)

Results in Table 3 show that the Cronbach’s Alpha obtained was .947, which is above 0.7. That means that the data collection instruments would be used to collect reliable data.

with conducting qualitative research. Face-to-face interviews were carried out by the researcher himself.

Procedure for data collection.

A covering letter from the university was obtained to enable the researcher to undertake the study in the selected departments of Juba City. The researcher employed three research assistants and one data entrant who are familiar

Data processing

Qualitative data collected from the key informants’ respondents will be edited and categorized according to themes and summarized into percentages in computer spreadsheets.

Quantitative.

Data was coded and entered into SPSS.

Data Analysis

The qualitative data was analyzed, given the use of an interview guide, documentary review, and observation, linking them to the variables while examining the relationship. The data were then coded and entered into the computer using the statistical package for social scientists (SPSS version 20.0). Data manipulation was through the Pearson correlation coefficient and regression analysis to establish the relationship between variables.

Measurement of variables

Public participation as an independent variable was measured in terms of percentages and ratios of public involvement in planning, implementation, and monitoring. Sustainability as a dependent variable was measured through triangulation of the relationship between public participation in terms of financial, technical, and institutional sustainability.

Results

Response rate

Table 4 Response rate

Instruments	Targeted	Conducted/Returned	Percentage
Questionnaires	115	80	70%
Interview guides	17	14	82%
Total	132	94	71%

Source: Primary data (2023)

Table 4 shows that out of 115 questionnaires distributed, 80 were returned, giving a response rate of 70%. In addition, out of 17 interviews, 14 were conducted, giving a response rate

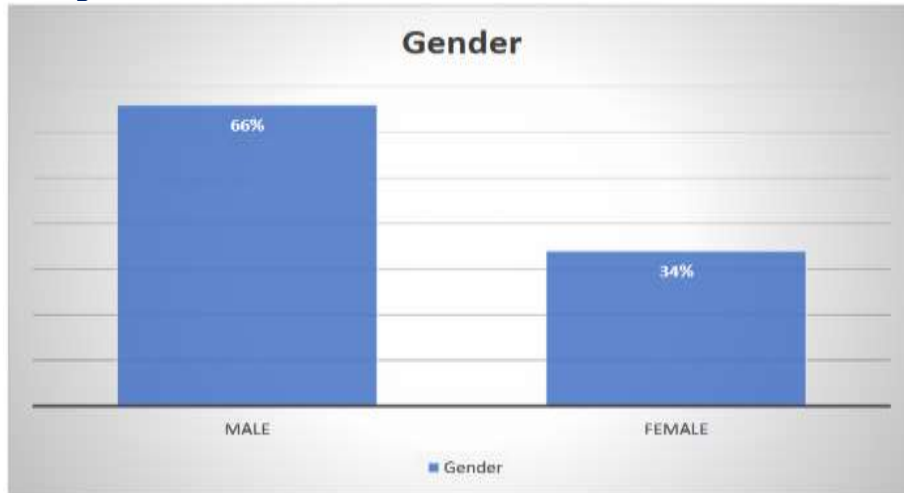
Planning was measured in terms of community participation in needs identification, work plan development, and technology selection as supported by Bartle (2022). In addition, implementation was measured in terms of establishment of water, maintenance, and donor support and leadership skill development (Atkinson et al., 2023). On the other hand, participation in monitoring was measured in terms of performance analysis, appraisal, and information dissemination (Kiyimba, 2023), while sustainability was measured in terms of functional and operational sustainability (Narayan, 2022).

Ethical considerations.

The study took into account ethical considerations; that is, the researcher first sought consent from all prospective respondents and then explained to them what the study was all about. Further assurance and confirmation were given to respondents that the information received was treated with confidence and for use in academic purposes only.

of 82%. “The overall response rate was 71% which is above the recommended two-thirds (67%) response rate” (Mugenda & Mugenda, 2023).

Background characteristics

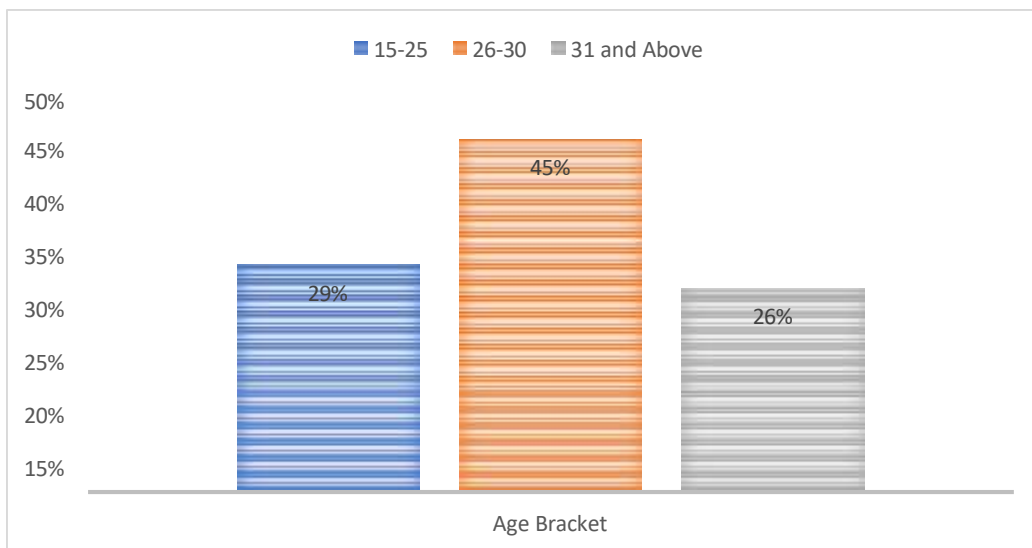


Source: Primary data (2023).

Results in Figure 1 show that the majority (66%) of the respondents were males. On the other hand, 34% of the respondents were females. The above findings imply that

study results were obtained from a gender balanced sample size, therefore, not gender biased.

Figure 2: Respondents according to age group

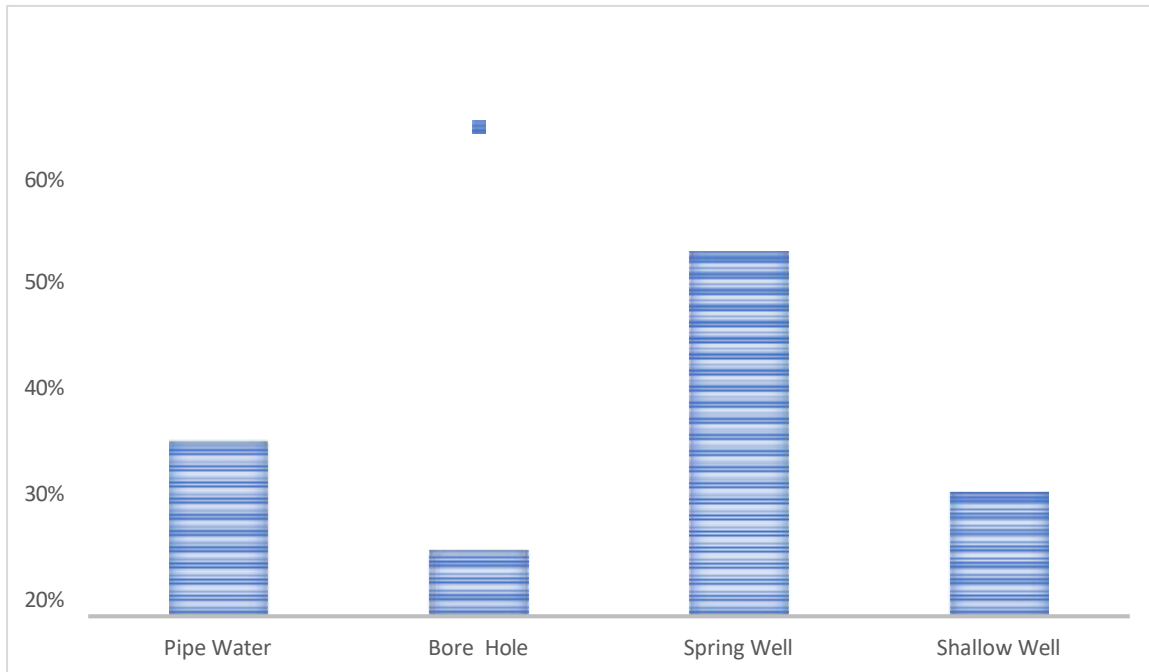


Source: Primary data (2023).

According to Figure 2 majority, 45% of the respondents, were aged between 26 – 30. In addition, 29% were aged 16 – 25, while 26% of the respondents were aged 31 years and

above. This implies that most respondents were mature and able to understand the purpose of the study to give valid responses.

Figure 3: Type of water source provided.



Source: Primary data (2024).

Results in Figure 3 show that the majority, 50% of the respondents, used spring wells. 24% of the respondents used piped water, 17% shallow well, while 9% used boreholes.

The above results indicate that community members had access to different types of water sources and were able to provide reliable data for the study.

Table 5: Descriptive statistics on the sustainability of water sources

Sustainability	SD	D	NS	A	SA	Mean	Std. Dev
Water equipment are functional most of the time.	12%	9%	9%	43%	27%	3.66	.959
Equipment for water Sources are effectively used	7%	7%	10%	56%	20%	3.66	1.024
There is sustained water supply to the Public	11%	13%	12%	48%	16%	3.33	1.059
There is effective accountability of funds for water sources	49%	10%	5%	12%	25%	2.48	1.093
Water Sources are fully operational all the time	15%	13%	11%	42%	19%	3.77	.986
Water Sources have enough equipment for project success.	42%	11%	8%	13%	26%	2.53	1.119
Water Sources fully address the needs of Public members.	38%	16%	4%	30%	12%	2.95	1.197

Results in Table 5 show that 70% of the respondents agreed that water equipment is functional most of the time. On the

other hand, 21% disagreed, and 9% were not sure. The corresponding mean for the statement was 3.66, which is

above average, while the standard deviation was .959, representing the number of respondents who gave varying responses. The mean is above average, which implies that the majority of respondents held the view that water equipment is functional most of the time. On whether equipment for water sources is effectively used, 76% agreed, 14% disagreed, and 10% were not sure. The findings were verified with a mean value of 3.66, which is above average, while the standard deviation was 1.025. This implies that due to public participation, equipment for water sources is effectively used. The above findings were supported by an interviewee who had this to say;

“Equipment for water sources is effectively used and protected because if not properly handled, community members will run short of water, which is essential for their lives.”

During the study, respondents were asked whether there was a sustained water supply to the public. To this, 64% of the respondents agreed, 24% disagreed, while 12% were not sure. The corresponding mean value for the statement was 3.33, which is above average, while the standard deviation was 1.059. This implies that the majority of the respondents supported the statement. That there is effective accountability of funds for water sources was supported by 37% of the respondents, while the majority, 59% disagreed, and 5% were not sure. The above statistics were verified with a mean of 2.48, which is below average, while the standard deviation was 1.093, representing the number of respondents with varying responses. This shows that very few respondents held the view that there is effective accountability of funds for water sources. The above findings were supported by an interviewee who had this to say;

“There is inadequate accountability of funds for water sources because of corruption tendencies in the water sector. Each village was supposed to have at least three boreholes,

but only one was constructed, yet funds to construct three boreholes were released by donors”.

When respondents were asked whether water sources are fully operational all the time 61% agreed, 28% disagreed, and 11% were not sure. The obtained mean value for the statement was

3.77, which is above average, while the standard deviation was 0.986, implying that some respondents gave varying responses.

On whether water sources have enough equipment for project success, only 39% of the respondents agreed. The majority, 53% disagreed, while 13% were not sure. The statistics were verified with a mean of 2.53, which is below average, and a standard deviation of 1.119. This implies that few respondents held the view that water sources have enough equipment for project success. The above findings were further supported by a key informant during face-to-face interviews when he said;

“Water sources do not have enough equipment for project success because when a borehole breaks down, it takes more than six months to get repaired due to a lack of equipment. This hurts the water supply to community members.”

That water sources fully address the needs of public members was supported by 42% while 54% disagreed, and 4% were not sure. The obtained mean for the statement was 2.95, which is below average, while the standard deviation was 1.197, implying that some respondents gave varying responses.

Overall, the results indicate that the sustainability of water sources has been affected by inadequate accountability of funds for water sources due to corruption tendencies. This has

affected the availability of equipment for project success and further limited the ability of water sources to address the needs of the public.

Participation in project planning and the sustainability of water sources in Juba Town Block

Descriptive statistics on public participation in project planning

Table 6: Descriptive statistics on public participation in project planning

Planning	SD	D	NS	A	SA	Mean	Std. Devn.
Public members are involved in identifying project needs during the planning stage.	3%	57%	6%	14%	20%	2.80	1.179
The project hires experts in the project to participate in needs identification.	1%	18%	12%	53%	16%	3.91	1.064
Needs identification answers all questions about water Sources.	14%	8%	5%	53%	20%	3.58	.969
Needs identification considers Sources' identical indicators.	4%	19%	9%	54%	14%	3.37	1.221
Identification of needs integrates information obtained from assessments by Public members.	2%	11%	5%	59%	23%	4.05	.054
Public members are involved in drafting a work plan to follow while carrying out water Sources' activities.	39%	23%	14%	4%	21%	2.77	1.191
Public members participate in formulating a budget used by funding agencies for justifying the release of money.	45%	23%	5%	2%	25%	2.52	1.122
Water Sources have work plans used to identify a specific time segments within that project	10%	6%	14%	50%	20%	3.85	1.087
Project work plans are used to identify the problems to be solved, makes them finite, precise and verifiable as objectives.	21%	18%	10%	55%	6%	3.56	.957
Public members are involved in the selection of appropriate technologies.	53%	15%	5%	14%	13%	2.63	1.050

According to the results in Table 6, only 34% of the respondents agreed that public members are involved in identifying project needs during the planning stage. The majority, 60% disagreed, while 6% were not sure. The corresponding mean obtained for the statement was 2.80, which is below average, while the standard deviation was 1.1179. Since the mean was below average, it implies that few respondents held the view that public members are involved in identifying project needs during the planning stage. The above findings were supported by a respondent who had this to say;
 "A few public members are involved in identifying project needs. In most cases, the staff members at the district and councilors represent community members to identify needs. Sometimes, some of the identified needs are not the priority needs of community members."

When respondents were asked whether the project hires experts in the project to participate in needs identification, 69% agreed, 19% disagreed, and 12% were not sure. The results were verified with a mean value of 3.91, which is above average, and a standard deviation of 1.064. This shows that the project hires experts in the project, as confirmed by one of the respondents.
 Findings from the study further revealed that needs identification answers all questions about water sources, as reported by the majority, 73% of the respondents. However, 22% disagreed, while 5% were not sure. The corresponding mean value was 3.58, which is above average, while the standard deviation was .969, implying that some respondents did not agree with the statement.
 In addition, 68% of the respondents revealed that needs identification considers sources' identical indicators, although 23% disagreed, while 9% were not sure, with a

mean of 3.37 and a standard deviation of 1.221. Since the obtained mean was above average, it implies that most respondents were in agreement with the statement. The above findings were further supported by a respondent who had this to say;

“In the water sector, needs identification considers sources’ identical indicators, such as inadequate access to water sources, the distance one walks to reach the nearest water point, and many other indicators that warrant water supply in an area.”

Findings from the study further revealed that the identification of needs integrates information obtained from assessments by public members. This was supported by 82% of the respondents, although 13% disagreed, while 5% were not sure. The corresponding mean obtained for the statement was 4.05, which is above average, while the standard deviation was .054. This shows that the majority of the respondents held the view that the identification of needs integrates information obtained from assessments by public members.

When respondents were asked whether public members are involved in drafting a work plan to follow while carrying out water source activities, only 25% of the respondents agreed. The majority 62% agreed, while 14% were not sure. The obtained mean for the statement was 2.77, which is below average, while the standard deviation was 1.191, which suggests that public members are not involved in drafting a work plan to follow while carrying out water source activities. The above findings were supported by a respondent who had this to say;

“Public members are not involved in drafting a work plan to follow while carrying out water source activities. The plan is mostly done by the district engineer and other technical people from the Department of Natural Resources.”

Relatedly, only 30% of the respondents revealed that public members participate in formulating a budget used by

funding agencies for justifying the release of money. The majority, 68% disagreed, while 5% were not sure. The findings were verified with a mean value of 2.52, which is below average, while the standard deviation was 1.122. This implies that few members were in agreement with the statement.

On whether water sources have work plans used to identify specific time segments within that project 70% agreed, 16% disagreed, and 14% were not sure. The corresponding mean for the statement was 3.85, which is way above average, while the standard deviation was 1.087, implying that some respondents gave varying responses. Since the obtained mean was above average, it implies that most respondents held the view that water sources have work plans used to identify a specific time segment within that project.

That project work plans are used to identify the problems to be solved, making them finite, precise, and verifiable, as objectives were consented to by 61% of the respondents. However, 39% disagreed, while 10% were not sure. The results were verified with a mean of 3.56, which is above average, and a standard deviation of .957. Asked whether public members are involved in the selection of appropriate technologies, 27% agreed, 68% disagreed, while 5% were not sure. The corresponding mean value for the statement was 2.63, which is below average, while the standard deviation was

1.050, which implied that some respondents did not agree with the statement. The above findings were further supported by a respondent who had this to say;

“When selecting appropriate technologies, public members are not involved. It is assumed that it is the work of engineers and other specialists in the water sector. Indeed, community members may not have good knowledge of appropriate technologies.”

Table 7: Correlation matrix for public participation in project planning and sustainability

		Correlations	
		Planning	Sustainability
Planning	Pearson Correlation	1	.539**
	Sig. (2-tailed)		.000
	N	80	80
Sustainability	Pearson Correlation	.539**	1
	Sig. (2-tailed)	.000	
	N	80	80

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

Results in Table 7 show that the correlation coefficient was 0.539**, which shows a strong positive relationship between the two variables, and its significance was 0.000 at the 0.01 level, which is less than the 0.05 level of significance. This implies that planning has a significant positive relationship with the sustainability of the water source. Therefore, if the public is allowed to participate in needs identification, work plan development, and

technology selection, they will greatly contribute to the sustainability of the water source. On the other hand, If public members do not participate in the planning process, water sources are likely not to be sustainable. From all the results obtained, the hypothesis that “there is a positive significant relationship between public participation in project planning and sustainability of water Sources” was accepted.

Public participation in project implementation and project sustainability
Descriptive statistics of public participation in project implementation.

Table 8: Descriptive statistics on public participation in project implementation.

Implementation	SD	D	NS	A	SA	Mean	Std.Dev
Public members participate in provision of essential needs like digging of wells.	5%	10%	9%	52%	24%	3.63	.894
Public members participate in conducting training to water user committees.	4%	18%	11%	35%	32%	3.84	.940
Public members are involved in maintenance of equipment for water Sources	12%	14%	6%	41%	27%	3.58	.931
Public members participate in inspections of water Sources.	5%	29%	11%	36%	19%	3.94	.925
Public members are involved in the leadership of water Sources	15%	6%	6%	32%	41%	4.04	.926
The project team is accountable to Public members on project activities	53%	18%	9%	1%	19%	2.31	1.192
Public members make financial contributions to the implementation of water Sources	43%	27%	10%	14%	6%	2.28	1.199
Public members contribute material support to the implementation of water Sources	15%	11%	7%	42%	25%	3.82	1.010
People are encouraged to become involved in sources that benefit from local skills	12%	13%	14%	48%	13%	3.85	.878
Public participation contributes to better outcomes of water Sources.	2%	14%	6%	41%	37%	3.65	.948

According to the results in Table 8, 76% of the respondents agreed that public members participate in the provision of essential needs, like the digging of wells. On the other hand, 15% disagreed, while 9% were not sure. The corresponding mean obtained for the statement was 3.63, which is above average, implying that most respondents were in agreement with the statement. On the other hand, the standard deviation of 894 signified that there were a few respondents who gave varying responses. The above findings were supported by a respondent who had this to say;

“...since community members are the end users of water sources, they always participate in the provision of essential needs like drilling of wells, and sometimes offering pieces of land where wells and bore holes can be constructed.”

On whether public members participate in conducting training for water user committees, 22% agreed, 67% disagreed, while 11% were not sure. The results were verified with a mean of 2.44, which is below average, and a standard deviation of 1.190, representing the number of respondents with varying responses.

Results in Table 4.8 further revealed that public members are involved in the maintenance of equipment for water sources. This was supported by 68% of the respondents who agreed, compared to 26% who disagreed, while 11% were not sure. The results were verified with a mean of 3.58, which is above average, and a standard deviation of 0.931.

This shows that most respondents held the view that public members are involved in the maintenance of equipment for water sources. The above findings were further supported by an interviewee who had this to say;

“Public members are responsible for maintaining and protecting the equipment of water sources since they are the beneficiaries.”

Asked whether public members participate in inspections of water sources, 74% of the respondents agreed, 15% disagreed, while 11% were not sure. The corresponding mean value for the statement was 3.94, which is way above average, while the standard deviation was .925. This shows that most respondents agreed with the statement.

When respondents were asked whether public members are involved in the leadership of water sources, 38% of the respondents agreed, 56% disagreed, and 6% were not sure. The findings were verified with a mean of 4.04, which is way above average, and a standard deviation of .926, which represents the number of respondents with varying responses.

That the project team is accountable to public members on project activities was confirmed by only 20% of the respondents. The majority, 71% disagreed, while 9% were not sure. The obtained mean for the statement was 2.31, which is far below the average, while the standard deviation was 1.192, implying that some respondents gave varying

responses. In addition, only 20% of the respondents agreed that the public members make financial contributions to the implementation of water sources. The majority, 70% disagreed, while 10% were not sure.

The corresponding mean obtained was 2.28, which is below average, and the standard deviation, 1.199, which shows variations in the responses obtained. The above findings were supported by a respondent who had this to say;

“...community members do not make financial contributions to the implementation of water sources. They instead make material contributions such as land where water sources can be constructed, as well as providing the required labour during community work.”

Study findings revealed that public members contribute material support to the implementation of water sources, as revealed by 67% of the respondents. However, 26%

disagreed, while 7% were not sure. The corresponding mean obtained for the statement was 3.82, which is way above average, and a standard deviation of 1.010, which implied that some respondents gave varying responses.

That people are encouraged to become involved in sources that benefit from local skills was supported by 61% of the respondents, although 25% disagreed, while 14% were not sure, with a mean value of 3.85 and standard deviation of .878. The study further showed that public participation contributes to better outcomes of water sources. This was supported by 78% of the respondents, while 16% disagreed and 6% were not sure. The results were verified with a mean value of 3.65, which is above average, while the standard deviation of .948 implied that some respondents gave varying responses.

Relationship between public participation in project implementation and project sustainability

Table 9: Correlation matrix for Public participation in project implementation and project sustainability

		Implementation	Sustainability
Implementation	Pearson Correlation	1	.595**
	Sig. (2-tailed)		.000
	N	80	80
Sustainability	Pearson Correlation	.595**	1
	Sig. (2-tailed)	.000	
	N	80	80

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

Results in Table 9 show that the correlation coefficient was 0.595**, which shows a strong positive relationship between the two variables, and its significance was 0.000 at the 0.01 level, which is less than the 0.05 level of significance. This implies that public participation in project implementation has a significant positive relationship with the sustainability of the water source. Therefore, if the public is allowed to participate in the project implementation through the establishment of water sources, maintenance,

donor support, and leadership skill development, there will be improved sustainability of water sources. On the other hand, if public members do not participate in the implementation process, water sources are likely not to be sustainable. From all the results obtained, the hypothesis that “there is a positive significant relationship between public participation in project implementation and sustainability of Water Sources” was accepted.

Public participation in project monitoring and the sustainability of water sources

Descriptive statistics of public participation in project monitoring

Table 10: Responses on public participation in project monitoring

Monitoring	SD	D	NS	A	SA	Mean	Std. Dev.
Public monitoring of water Sources contributes to social accountability for the provided services	1%	13%	7%	42%	37%	3.67	.970
Public members participate in local budget monitoring for water Sources.	30%	36%	14%	10%	9%	2.28	1.169
Public members are involved in effective dissemination of information about Sources.	2%	16%	9%	49%	22%	3.78	1.046
Public members are involved in developing a framework for measuring project results.	47%	35%	12%	2%	4%	2.14	1.961
Monitoring is an integral part of implementation process.	1%	7%	15%	48%	28%	3.94	1.054
Monitoring supports quality control, and contribute to best practice	4%	3%	10%	53%	30%	3.96	.854
Participatory monitoring helps public members to make informed decisions regarding water Sources.	10%	6%	7%	44%	32%	3.87	.897
There is periodical participation in quality inspections on water Sources.	7%	14%	12%	37%	30%	3.76	.866
There is proper documentation for reviews and monitoring reports	41%	7%	15%	8%	28%	3.78	.983

Results in Table 10 show that 79% of the respondents agreed that public monitoring of water sources contributes to social accountability for the provided services. On the other hand, 14% disagreed, while 7% of the respondents were not sure. The corresponding mean for the statement was 3.67, which is above average, while the standard deviation of .970 represented the number of respondents with varying responses. This shows that when the public members are involved in monitoring and evaluation of water sources, there will be improved social accountability, which in turn leads to sustainability.

When respondents were asked whether public members participate in monitoring local budgets for water sources, only 19% agreed, while the majority 66% disagreed, and 14% were not sure. The findings were verified with a mean of 2.28, which is below average, and a standard deviation of 1.169. Since the obtained mean was below average, it implies that very few respondents were in agreement with the statement. The above findings were confirmed by a respondent during face-to-face interviews when he said; “Public members are not involved in local budget monitoring. It is on the District team and staff members from the Department of Natural Resources/water who are involved in budgeting and budget monitoring.”

The study further revealed that public members were involved in the effective dissemination of information about sources. This was reported by 71% of the respondents, compared to 18% who disagreed and 9% who were not sure. The obtained mean for the statement was 3.78, which is above average, while the standard deviation was 1.046. This implies that most respondents held the view that public members are involved in the effective dissemination of information about sources.

During the study, only 6% of the respondents agreed that public members are involved in developing a framework for measuring project results. The majority, 82% of the respondents, disagreed, while 12% were not sure. The obtained mean for the statement was 2.14, which is way below average, while the standard deviation was 1.961. Since the obtained mean was below average, it implies that very few respondents agreed with the statement. The above findings were further confirmed during face-to-face interviews when one of the respondents had this to say; “Public members are not involved in developing a framework for measuring project results. The framework is developed by the water sector together with donors and the Ministry of Water and Environment.”

When respondents were asked whether monitoring is an integral part of the participatory program design and implementation process, 76% of the respondents agreed, while 8% disagreed, and

15% were not sure. The corresponding mean for the statement was 3.94, which is above average, and a standard deviation of 1.054, representing the number of respondents with varying responses. In addition, monitoring supports genuine accountability and ensures quality control, and contributes to best practice. This was reported by 83% of the respondents, although 7% disagreed, while 10% were not sure. The obtained mean value for this statement was 3.96, which is above average, and the standard deviation of .854, which implies that there were variations in the responses obtained.

Study findings further revealed that participatory monitoring helps public members to make informed decisions regarding water sources. This was confirmed by 76% of the respondents who agreed with the statement. Only 16% disagreed, while 7% were not sure. The obtained mean for the statement was 3.87, which is above average, and the standard deviation of .897. This shows that most

respondents were in support of the statement. The above findings were supported by a respondent who had this to say; “Public participation in monitoring of water resources is good because the public/community members are the end users of water. Therefore, if they are involved in monitoring, there will be minimal damage to water sources, which leads to sustainability.”

When respondents were asked whether there is public periodical participation in quality inspections on water sources, 67% of the respondents agreed, although 21% disagreed and 12% were not sure. The corresponding mean for the statement was 3.76, which is above average, while the standard deviation was .866. On whether there is proper documentation for reviews and monitoring reports, only 36% of the respondents agreed, while the majority 48% disagreed, and 15% were not sure. The corresponding mean for the statement was 2.78, which is below average, while the standard deviation was 1.983. Since the obtained mean is below the average, it implies that very few respondents were in agreement with the statement.

Relationship between Public participation in project Monitoring and the sustainability of water Sources

Table 11 Correlation matrix for Public participation in project Monitoring and sustainability of water Sources

		Correlations	
		Monitoring	Sustainability
Monitoring	Pearson Correlation	1	.764**
	Sig. (2-tailed)		.000
	N	80	80
Sustainability	Pearson Correlation	.764**	1
	Sig. (2-tailed)	.000	
	N	80	80

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

Results in Table 11 show that the correlation coefficient was 0.764**, which shows a strong positive relationship between the two variables, and its significance was 0.000 at the 0.01 level, which is less than the 0.05 level of significance. This implies that public participation in project monitoring has a significant relationship with the sustainability of water sources. Therefore, if the public is involved in performance analysis, appraisal, and

information dissemination regarding project activities, water sources will be sustainable. On the other hand, if public members do not participate in monitoring water projects, water sources are likely not to be sustainable. From all the results obtained, the hypothesis that “there is a positive significant relationship between Public participation in project Monitoring and the sustainability of water sources” is accepted.

Multiple regression analysis

Table 12 Regression Analysis of the component variables

Model	Un standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.480	.309		1.551	.125
Planning	.017	.117	.017	.147	.884
Implementation	.031	.133	.030	.229	.820
Monitoring	.698	.113	.730	6.197	.000
R =0.765 R- square = 0.585 F= 35.213 Sig = 0.000					

Table 12 shows the components of public participation, that is, planning, implementation, and monitoring, which significantly predict the sustainability of water sources as shown by the significance level (.000). The regression analysis showed that the study variables had a strong positive relationship with the sustainability of water sources ($r=0.765$). Thus, the study variables explain 58.5% of the variance in the sustainability of water resources in Juba Town Block.

The findings further revealed that public participation in monitoring (Beta .730, Sig. < .000) was a better predictor of the sustainability of water sources. However, participation in planning (Beta = .017, Sig. < .884) and implementation (Beta .030, Sig. < .820) were not significant predictors of the sustainability of water sources. This implies that the participation of the public.

Monitoring is of paramount importance in order to ensure the sustainability of water sources in Juba Town Block.

Discussion of results

Public participation in project planning and project sustainability.

Pearson's correlation coefficient for public participation in project planning and sustainability of foreign-funded water Sources in Juba Town Block was $r = 0.539^{**}$, with a probability value ($p = 0.000$) that is less than 0 .05 level of significance, showing a strong relationship between participation in planning and sustainability of foreign-funded water Sources.

Besides, during the study, it was established that a few public members are involved in identifying project needs during the planning stage. This is contrary to Rifkin (2022), who asserted that "community members should be involved in identifying their own needs". According to him, "public development should place much discussion specifically in promotion of participation by community members". However, findings from this study revealed that few public members are involved in identifying project needs. In most

cases, the staff members at the Town Block and councilors represent community members to identify needs. Sometimes, some of the identified needs are not the priority needs of community members, which affects the sustainability of foreign-funded water Sources. This is corroborated by Atkinson et al. (2023), who contend that "community representation by leaders may not be adequate to identify and address the immediate challenges people face".

Study findings further revealed that the project hires experts to participate in needs identification. This is supported by Gibson and Pappas (2023), who asserted that "needs are not directly assessed, but rather, the identification of needs is the result of a complex process that requires expert personnel, integration and synthesis of many factors, including the results from numerous assessments specialists". Therefore, if the project hires experts, there are high chances of providing quality services that contribute to project sustainability.

Findings from the study further revealed that needs identification answers all questions about foreign-funded water Sources as reported by the majority. This is consistent with Kusek & Rist, (2023) who argued that "the assessments synthesized into needs should address all concerns such as the pre-event levels of function, the amount and types of damage sustained initially and existing at the current time; current levels of function and the levels of function detected by the last assessment, the presence of a surge, the demands of the population affected, the culture in which the event occurred, the climate in the affected area, the geography and access to the affected area; and politics".

In addition, study findings revealed that needs identification considers sources' identical indicators. This is consistent with Bartle (2022), who revealed that "to identify needs, assessments and requirements must use identical indicators". Needs are expressed in terms of goods and/or services. In the water sector, needs identification considers identical indicators such as inadequate access to foreign-

funded water Sources, the distance that one walks to reach the nearest water point, and many other indicators that warrant water supply in an area.

Findings from the study further revealed that the identification of needs integrates information obtained from assessments by public members. In addition, public members are involved in drafting a work plan to follow while carrying out foreign-funded water Sources' activities. This is further supported by Gibson and Pappas (2023), who contend that "a work plan is required and should be based upon a project already approved, and identify a specific time segment within that project or programme". Other study findings indicated that public members are not involved in drafting a work plan to follow while carrying out foreign-funded water Sources activities. The plan is mostly done by the City engineer and other technical people from the Department of Natural Resources.

According to study findings, few public members are involved in the selection of appropriate technologies. When selecting appropriate technologies, most public members are not involved. It is assumed that it is the work of engineers and other specialists in the water sector. Indeed, community members may not have good knowledge of appropriate technologies. This is corroborated by Rosenfeld and Shohet (2019), who stated that "projects need to consider emerging technologies and tools which have great potential to help project teams mitigate risks associated with unknown existing site and equipment conditions or other factors".

Public participation in project implementation and the sustainability of foreign-funded water Sources

Pearson's correlation coefficient for public participation in project implementation and sustainability of foreign-funded water Sources in Juba City was $r = 0.595^{**}$, with a probability value ($p = 0.000$) that is less than 0 .05 level of significance, showing a strong relationship between public participation in project implementation and sustainability of foreign-funded water Sources.

Study findings established that public members participate in the provision of essential needs, like the digging of wells. This promotes sustainability because community members feel ownership of the project and the related activities. This is corroborated by Bernfield (2021), who revealed that "process implementation should involve active participation of community members to promote ownership and project sustainability". Similarly, Cueto (2023) supported that "public participation assumes that people would be more supportive, people would provide resources, people would change risky behaviors, and people would be empowered". Findings from the study revealed that few public members participate in conducting training for water user committees, although they are involved in the maintenance of equipment for foreign-funded water Sources. This is consistent with

Rifkin (2022), who asserted that "public members should be responsible for maintaining and protecting equipment of foreign-funded water Sources since they are the beneficiaries". In addition, Bartle (2023) contends that, "in the water sector community members should be involved in procedures for conducting training to water user committee, supervision of pump mechanics and reporting on the expressed needs of the Public". It was further established that public members participate in inspections of foreign funded water Sources. This is consistent with Gibson and Pappas (2023) who stated that "frequent, regular inspections are a major component of an effective maintenance system". The agency requires management, at a minimum, to perform an annual inspection of each unit. Inspecting a unit establishes its condition and may help clarify responsibility for any damages that have occurred. Study findings found that few public members are involved in the leadership of foreign-funded water Sources. This is contrary to Camino and Zeldin (2023), who asserted that "quality local leadership, training and supervision, and democratic input and involvement are important components of Public participation".

Public participation in project monitoring and sustainability of foreign-funded water Sources

Pearson's correlation coefficient for public participation in project monitoring and sustainability of foreign-funded water Sources in Juba City was $r = 0.764^{**}$, with a probability value ($p = 0.000$) that is less than 0 .05 level of significance, showing a strong relationship between public participation in project monitoring and sustainability of foreign-funded water Sources.

During the study, it was established that public monitoring of foreign-funded water Sources contributes to social accountability for the provided services. This is consistent with Khemani (2018), who revealed that "the need for public monitoring in public service development is premised on the fact that local oversight raises social accountability for public service providers". However, study findings revealed that few public members participate in monitoring local budget for foreign-funded water Sources only, yet Larrauri (2022) asserted that "public monitoring of programs was beneficial for local budget monitoring". Public members are not involved in local budget monitoring. It is on the City team and staff members from the Department of Natural Resources/Water who are involved in budgeting and budget monitoring.

Findings from the study revealed that public members are involved in the effective dissemination of information about sources. This is consistent with Kiyimba (2023) who noted that "sharing and disseminating information in an appropriate, targeted and timely fashion is a frequent distinguishing characteristic of monitoring and evaluation

utilization and that all information needs to be relevant, timely and written in an understandable form addressing the questions that need to be answered and be presented in a form best understood". Study findings revealed that monitoring is an integral part of participatory program design and implementation process. This is supported by Barnes (2023) who asserted that "monitoring and evaluation is an integral part of participatory program design and implementation process. Monitoring and evaluation measures progress, adjustments, and notifications, and provides periodically analyzed information for decision makers to agree on the objectives and activities.

According to findings from this study, monitoring supports genuine accountability and ensures quality control, and contributes to best practice. In addition, participatory monitoring helps public members to make informed decisions regarding foreign-funded water Sources. This is consistent with Matov (2022), who suggested that "participation in monitoring is rights-based and establishes identity and interests which are critical for achieving quality".

Conclusions.

The study concludes that public participation methods have been engaged in project implementation of foreign-funded projects and included role-playing the public in workshops and trainings, and the use of focused group discussions has been used as a popular method of public participation, while grassroots diaries with the grassroots people have not been engaged to secure public participation. Based on study findings, it was concluded that public participation in project planning has a strong positive relationship with the sustainability of foreign-funded water Sources.

In line with findings from this study, it was concluded that there is a strong positive relationship between public participation in project implementation and sustainability of foreign-funded water Sources.

It is also concluded that there is a strong positive relationship between public participation in project monitoring and the sustainability of foreign-funded water Sources.

Recommendations.

Public members should be involved in the drafting of project work plans and work breakdown structures while carrying out foreign-funded water Sources' activities. This will promote community involvement and participation, which, in turn, in line with the findings of the current study, will ensure enhanced project ownership, project protection, and sustainability. Cases of unsustainable practices of vandalizing project pipes and hardware, water diversions, misuse, and destruction of water systems will be minimized. The project implementing organization should be accountable to the public members on project activities. This will promote effective and efficient utilization of resources,

which will lead to project sustainability. In addition, community members should be encouraged to make financial contributions to the implementation of foreign-funded water Sources in situations where the damage is minimal and may not wait for funding from the Government or donor agencies. Further, resistance to project implementation activities will be minimal, and sabotage and violence against the project activities will be minimized. In effect, project protection and sustainability of the water supply systems will be ensured.

Public members participate in budget monitoring for foreign-funded water sources to ensure that financial resources are put to proper and intended use. In addition, public members should be involved in developing a framework for measuring the project results.

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List of abbreviations.

GOSS: Government of South Sudan

SS: South Sudan

KU: Team University

JC: Juba City

MWE: Ministry of Water and Environment

MoFP: Ministry of Finance and Planning

JUWS: Juba Urban Water Supply

JTB: Juba Town Block

JCC: Juba City Council

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There is no conflict of interest.

Availability of data.

Data used in this study are available upon request from the corresponding author.

Author's contribution.

LAEK designed the study, conducted data collection, cleaned and analyzed data, drafted the manuscript, and NW supervised all stages of the study from conceptualization of the topic to manuscript writing and submission.

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