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USERS' PERCEPTIONS OF UGANDA'S E-DIARY APPLICATION FOR GENERATING QUALITY EXTENSION MONITORING AND SUPERVISION DATA: EVIDENCE FROM SIX DISTRICTS

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ABSTRACT

Traditional paper-based reporting systems for monitoring and supervising agricultural extension services are often slow, costly, and inefficient, particularly in geographically dispersed settings. Despite the growing use of electronic diaries in health and education, their application in agricultural extension remains underexplored. This study assesses the capacity of Uganda's E-diary application to generate quality data for monitoring and supervision of agricultural extension service delivery from users' perspectives. Guided by Trist and Bamforth's (1951) Socio-Technical Systems Theory, the study employed a mixed-methods design across six purposively selected districts from over 90 districts where the application had been piloted. Quantitative data were collected through a survey of 246 randomly selected extension workers from a sampling frame of 367, while qualitative data were obtained through six focus group discussions involving 60 participants and six key informant interviews with supervisors. Quantitative data were analysed using RStudio, while qualitative data were examined thematically. The findings indicate that the application generates both quantitative and qualitative data. However, over 60% of extension workers expressed neutral perceptions of data quality across the six assessed dimensions. The overall composite quality index was 3.36 (SD = 0.62; IQR = 0.65) on a five-point Likert scale, indicating a modest positive assessment. The predominance of neutral responses was attributed to limited practical exposure to the application. The findings reinforce the socio-technical perspective that data quality depends on the joint optimisation of technological systems and users' practices. The study recommends incorporating data review functionality into the application and promoting its use by MAAIF. Further research should objectively assess the quality of data generated.

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INTRODUCTION

Monitoring and supervision are central to improving the delivery of agricultural extension services because they support planning, accountability, feedback, performance assessment, and evidence-based decision-making (Nweke, 2021; Yang and Ou, 2023). These systems enable the identification of extension workers' competencies, the assessment of farmers' needs, and the evaluation of intervention outcomes. However, despite their importance, monitoring and supervision systems in agricultural extension have not fully achieved their intended impact due to inconsistent data quality (Yang and Ou, 2023). Traditional paper-based reporting systems have been widely criticised for being slow, costly, and inefficient, particularly in geographically dispersed agricultural settings (Namyenya et al., 2022; Yang and Ou, 2023). Such delays in data collection, verification, analysis, and reporting weaken supervision, planning,

and resource allocation, ultimately undermining service responsiveness and effectiveness. The adoption of Information and Communication Technologies (ICTs) has introduced opportunities to strengthen monitoring systems through faster reporting, improved data management, real-time communication, and enhanced storage and retrieval of information (Zerfu et al., 2024).

In Uganda, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) introduced in 2019 a web- and mobile-based application known as the E-diary application to improve monitoring and supervision of agriculture extension services in Uganda (Namyenya et al 2022). The application was designed in line with the extension service delivery functions of planning, reporting, implementation, feedback and decision-making for agricultural extension services. The system enables extension workers to electronically record activities and submit reports to supervisors across different administrative levels. It is expected to improve reporting efficiency, reduce delays associated with manual systems, and strengthen evidence-based supervision and decision-making.

However, effective monitoring of agricultural extension services requires quality data (Yang and Ou 2023). And whereas E-diaries have the potential to generate data in real time and from hard-to-reach areas (Thynne et al., 2023), evidence from health service delivery indicates that e-diaries are associated with the generation of inaccurate and incomplete data (Bandarian-Balooch et al., 2017). In the same field, their capacity to generate reliable data is questionable (van Casteren et al., 2021). In the context of agricultural extension service delivery, such evidence is lacking. It is imperative to assess the type of data generated by the E-diary application, its quality and suitability for monitoring and supervision of agricultural extension service delivery. Poor-quality data undermines effective planning, resource allocation and decision-making processes (Mahanti 2019; World Health Organisation (WHO), 2023). Suvedi and Stoep (2016) argue that many public extension services have not used monitoring data to support staff and improve the quality of extension services. The failure to use generated data for monitoring has been attributed to data quality (Rendell et al., 2020). The study specifically addresses the question: how do extension workers perceive the quality of data generated by the E-diary application in terms of completeness, accuracy, timeliness, accessibility, format and alignment to user needs?

Data Quality for Monitoring and Supervision

Data quality is defined as the fitness of data for use in planning, operations, monitoring, and decision-making (Mahanti, 2019; Wang et al., 2025). High-quality data accurately represent field realities and meet users' informational needs. In agricultural extension systems, data quality is critical for planning, supervision, resource allocation, implementation, and feedback processes. In this context, the data generated through the E-diary application is of good quality if it is good enough to inform the different users at all levels of the functioning of agricultural extension services and highlight the existing gaps. This can only be achieved if the E-diary application generates data of the desired types format and meets the general data quality. The fitness for use basically requires data to be free from defects (Mahanti 2019). Overall data quality is the degree of its usability (Wang et al., 2024).

Scholars identify multiple dimensions of data quality across fields. In health, accuracy, completeness, timeliness, accessibility, reliability, relevance, and consistency have been identified by several scholars (Mahanti 2019; World Health Organization, 2023; Albrecht et al., 2023; Ghavaland et al., 2024). In other fields, accuracy, data volume, relevancy, precision, reliability, consistency, and timeliness were considered relevant for measuring data quality (Wang et al., 2024). Hence, the dimensions of data quality are relative to the different users and the associated data needs (Priestley et al., 2023; Carvalho et al., 2025). This also indicates that there is no universal definition of data quality and data quality dimensions (Mahanti 2019).

Some dimensions are often used interchangeably; for instance, reliability and consistency are frequently used to describe the extent to which data remain stable and produce similar results across different measurements (WHO, 2023). Hence, understanding the quality of the E-diary application-generated data from the users' perspective is essential. This requires focusing on the different dimensions in order to establish the overall health of the data (Mahanti 2019). Using the intuitive approach (Wang et al., 2024), this study focused on six data quality dimensions: accessibility, accuracy, completeness, timeliness, alignment to users' needs and format, which the researcher considers critical to measure the quality of data generated by the E-diary application.

The choice of the six quality dimensions was informed by the established data quality principles and functional information requirements of agricultural extension

monitoring and supervision. Completeness, accuracy and timeliness assessed the adequacy and reliability of generated information. Format focused on its structure, layout and presentation; alignment to user needs focused on whether the generated information is useful for planning, decision making and overall monitoring and supervision, while accessibility looks at practical accessibility, i.e whether extension workers could retrieve the information from the application. Hence, these dimensions provided a basis for assessing both the technical quality and practical utility of the information generated by the E-diary Application.

Data Accessibility

Data accessibility is not only the availability of information (Albrecht Overbeek and van de Weerd, 2023) but its flow as well (Nugraha et al., 2024). Digital information systems are reported to break barriers to information/data accessibility, including geographical and temporal constraints (Zerfu et al., 2024). Besides, accessibility of databases also influences extension workers' use of information for planning and implementation of their activities (Joel et al., 2019). Hence, the data generated by the E-diary should be accessible to all targeted users regardless of location and time.

Data Accuracy

Data Accuracy is achieved when data is correct and has no errors (Albrecht Overbeek and van de Weerd, 2023; Odeny et al., 2023). In other words, accurate data reflects the real situation in the field and/or what transpires in the field. Accurate data is necessary to reveal the real picture of what transpires in the field (Wolfenden et al., 2024). This makes accuracy an important aspect for measuring the E-diary application's capacity to generate quality data.

Data Completeness

Data Completeness is basically collecting data that captures the real situation in the field in sufficient breadth, depth and scope (Albrecht Overbeek and van de Weerd 2023). It is also complete if it allows making decisions (WHO 2023). This is why Odeny et al. (2023) note that data is complete if it contains the appropriate amount. Zerfu et al. (2024) add that data completeness can be achieved by comprehensive data collection. Data comprehensiveness is critical for use (Overton et al., 2022). Hence, the E-diary application can only improve monitoring and supervision of extension services when collected data covers all areas and associated details.

Data Timeliness

Timeliness requires that the data and reports are available within the required deadlines (WHO, 2023). For instance, lack of timely information affects planning and management of service delivery (Ayele et al., 2021). Therefore, the timeliness of data is its readiness when needed. Timely data paints the reality of a situation in the field at any one point in time as required. In any case, the supervisors of extension workers need to access the reports at the different levels whenever needed for either planning, making decisions and/ or providing feedback. Hence, the timely provision of data is essential for strategic and operational decisions (Yang and Ou, 2023).

Data formats

Data format is an important dimension that affects the use of generated data for monitoring and supervision. Generally, data format is the structure and organisation of data. Formats can be text-based, which is the most commonly used, such as CSV files. The format in which data are generated and presented influences user interpretation, perceived data quality, and overall utilisation (Mahanti 2019). Data can be presented in several ways; hence the format requirements for the targeted users are crucial for use (Raugh and Hughes, 2021). Data formats affect data storage, retrieval and use. A range of data is collected by the E-diary application, and the need to establish the views of the users about its format.

METHODOLOGY

An exploratory sequential mixed-methods design was used. The qualitative phase was conducted first to get an in-depth understanding of how the E-diary application functions in practice, including users' experiences and reporting mechanisms. The quantitative phase followed to statistically assess the capacity of the E-diary application. The initial qualitative inquiry involved focus group discussions with frontline extension workers and key informant interviews with their supervisors to explore experiences and perceptions surrounding the E-diary application capacity. Insights that emerged from these discussions informed the refinement of the structured questionnaire for the quantitative phase. Specifically, the qualitative findings helped identify relevant issues and clarify how selected study concepts

could be translated into survey questions and measurable indicators. The study was guided by Trist and Bamforth's (1951) Socio-Technical Systems Theory, which states that organisational performance depends on the optimisation of the social and technical systems (Sony and Naik, 2020). The E-diary application was conceptualised as an open monitoring system comprising inputs, processes, outputs, a feedback mechanism and decision-making components that collectively support the monitoring and supervision of extension functions. The inputs are the annual and quarterly plans entered into the system, reported field activities (Planned and unplanned). The processes include data entry, validation, aggregation and report generation. The outcomes are evidence-informed planning, supervision, and decision-making. The study was conducted in six purposively selected districts: Kasese, Kyenjojo, Kibaale, Serere, Rubanda and Oyam. District selection was based on records obtained from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), particularly focusing on districts with relatively high numbers of extension workers. Selecting districts with larger extension staff establishments provided broader experience and insights regarding the implementation and practical use of the application across different administrative and agricultural contexts.

The study targeted local government agricultural extension workers in Uganda because they are directly involved in the implementation of extension services. Hence, the utilisation of the e-diary system revolves around extension workers. More information was obtained from Ministry officials responsible for overseeing the e-diary system, District Production Officers (DPOs), and Focus Group Discussions (FGD) for deeper understanding and explanation.

For the qualitative phase, purposive sampling was used to select supervisors for Key Informant Interviews (KII) and frontline extension workers for Focus Group Discussions (FGD). Table 1 shows the number of participants in the qualitative data collection phase.

Table 1. Number of Key Informants and Focus Group Discussion Participants.

Designation of key informants	Level of operation	Sex	Number key informants
M and E	MAAIF	Male	1
ICT System administrator	MAAIF	Male	1
Information Scientist-extension communication and information	MAAIF	Female	1
Senior Information Scientist	MAAIF	Female	1
District Production and Marketing Officers (DPMOs)	District	Male	6
Total			10
	FGD participants		
Name of district	Number of males	Number of females	Total
Kyenjojo	6	2	8
Kasese	10	2	12
Oyam	9	1	10
Kibaale	6	2	8
Serere	7	1	8
Rubanda	11	3	14
Total	49	11	60

Quantitative data were collected from 246 extension workers selected from a target population of 367 staff across the six districts (Table 2). The sample size was determined using Cochran's formula for survey studies at a 95% confidence level and 5% margin of error (Uakarn et al., 2021). Proportionate stratified sampling was used to allocate respondents across districts. A total of 246 frontline extension workers were randomly selected using simple random sampling to participate in the survey. All extension workers in any of the six districts were eligible to participate.

In addition, system navigation and document review were conducted using a structured checklist to get more information regarding the E-diary application's data

quality. The review was conducted by the principal researcher to assess the nature, scope and quality of information captured by the application. Access to the system was facilitated by an official from the Ministry of Agriculture, Animal Industry and Fisheries. The researcher navigated the application and examined selected reporting templates and outputs generated at the different administrative levels.

Table 2. Sample size and Sample size determination.

District	Filled Positions		Total	Stratum sample size
	District level	Sub-county level		
Kibaale	10	61	71	47.6=48
Kasese	9	58	67	44.9=45
Rubanda	9	54	63	42.2=42
Oyam	11	47	58	38.9=39
Serere	14	41	55	36.9=37
Kyenjojo	8	45	53	35.5=35
Total	61	306	367	246

Qualitative data from KIIs and FGDs were analysed using a deductive thematic analysis approach. The initial analytical themes were derived from the study objectives and provided a predetermined structure for organising and interpreting the collected data (Caulfield, 2019; Pearse, 2019). The researcher was the sole coder and conducted repeated checks of the coded information against the original transcripts to ensure that the interpretations remained grounded in the participants' views. Transcripts were read repeatedly to achieve familiarity, followed by open coding to identify recurring concepts related to the application's data quality. The codes were grouped into themes predetermined at the outset of the study. These were interpreted to provide contextual depth to the quantitative findings (Caulfield, 2019; Pearse, 2019). The adequacy of the qualitative information was considered in relation to the relevance and depth of information obtained. Credibility was enhanced through triangulation of information obtained from FGDs and KIIs by identifying areas of convergence and divergence in perspectives.

All 246 questionnaires were administered and completed, giving a 100% response rate. The quantitative analysis treated individual respondents as independent observations and did not adjust standard errors within district clustering. Quantitative data were analysed using RStudio. Descriptive statistics (frequency, mean and standard deviation) were generated to examine the participants' views regarding the different data quality dimensions. A composite data quality index was computed to get an aggregate measure of the E-diary application's capacity to generate adequate data for monitoring and supervision of actors in Uganda's extension service delivery. The composite indicator was used because it recognises the multidimensionality of data quality (Muhanduzi and Wokadala, 2026).

RESULTS

Type of Data Generated using the E-diary Application

The E-diary application provides both qualitative and quantitative data. The application's reporting template allows the capture of both qualitative and quantitative information. The quantitative data mainly focused on the number of trainings, demonstrations conducted and the number of beneficiaries, among others. Quantitative data also provide insights into observable trends and patterns, such as pest and disease prevalence and the number of farmer trainings conducted.

The qualitative data help to explain the underlying reasons for these patterns, including factors contributing to high prevalence rates and the nature and effectiveness of the trainings delivered. From the system navigation and examination of the generated reports, it was discovered that the system generated reports at individual, district, zonal and national levels. It allowed structured reporting and aggregation of extension service delivery.

Quality of data generated by the E-diary Application

Table 1 below shows the respondents' perceptions about the quality of data generated using the E-diary application.

Table 1. Respondents' Perceptions about the Quality of Data Generated by the E-diary Application.

Data quality aspect	Mean	Mode	SD	Level of agreement				
				Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Accurate data (n=244)	3.55	3	0.84	0.8%	2%	61.8%	14.6%	20.7%
Complete data variables (n=243)	3.23	3	0.71	1.2%	8.1%	67.9%	14.6%	8.1%
Timely and updated (n=245)	3.38	3	0.72	0.4%	4.1%	63.8%	21.5%	10.2%
Alignment to user needs (n=244)	3.32	3	0.69	0.4%	4.0%	69%	17.6%	9%
Accessible (n=245)	3.48	3	0.8	0.4%	2.4%	63.8%	16.7%	16.7%
Format (n=245)	3.22	3	0.68	0.4%	5.7%	75.6%	9.3%	8.9%

According to Table 2, the majority of the respondents regarding all the quality data dimensions. Most (61.8%) expressed a neutral position regarding the accuracy of the generated data. About one quarter (20.7%) strongly agreed, while 14.6% agreed that the application can generate accurate data for monitoring. Very few respondents expressed negative views, with only 2.0% disagreeing and 0.8% strongly disagreeing. The mean score of 3.55 indicates a moderate tendency towards agreement, suggesting that generally they have limited confidence in the application to generate accurate data. The standard deviation (SD=0.84) reflects moderate variation in responses, implying differing user experiences of the application. This is further confirmed by the qualitative findings in Table 3, where concerns about accuracy were raised. Extension workers' accounts suggest that data accuracy concerns extend beyond typing errors to the reliability of location information.

Concerning data completeness, more than half of the respondents (67.9%) remained neutral about the E-dairy application's ability to generate complete data. Less than a quarter (14.6%) agreed, and 8.1% strongly agreed that the application produces complete data, while 9.3% expressed disagreement (8.1% disagree; 1.2% strongly disagree). The mean score of 3.23 (SD=0.71) suggests a slight inclination towards agreement, though the high neutrality indicates that many users may not yet be sufficiently exposed to the E-diary application. The qualitative findings in Table 3 point to the differences between the ability to enter an activity and the completeness of the information available for its monitoring. The sampled reporting templates contained several categories of information relevant to monitoring extension service delivery; individual activity reports captured the extension worker's name, designation, location, budget, planned activities, topics and enterprises covered and number of beneficiaries reached. There is a provision for recording grievances, agricultural crises and outbreaks, and photographic evidence of activities. At the district level, reports provided information on the number of lower local government, production and marketing officers, extension staff by sector, activities undertaken, beneficiaries reached and reported outbreaks. Activity maps, photographs and information identifying the best and worst performing extension officers are also included. Additionally, some respondents indicated that the application allows capture of even more information, while others noted that there are gaps. For instance, some farmer details and crop production information are not captured, and some activities are only captured under unplanned function.

Similarly, participants' views regarding the timeliness of the data generated were largely neutral. Nearly three-fifths of the respondents (63.8%) neither agreed nor disagreed, while 21.5% agreed that the E-diary application generated real-time data and is regularly updated. A smaller portion expressed negative views (4.5%), and 10.2% strongly agreed. The mean score of 3.42 (SD=0.72) indicates a general tendency towards agreement, suggesting that the application is reasonably capable of real-time data generation, albeit with some uncertainty among the respondents.

Qualitative findings in Table 3 suggest that the application is rated for timely data delivery in Kibaale and Serere districts. Concerning the format, most respondents (75.6%) reported a neutral stance.

Table 2. Qualitative Findings Regarding Perceived Potential.

Sub-theme	Consolidated descriptive code	Illustrative participant quotation	Participant group / location / year
Data accuracy	Errors in names and location details	"Sometimes names for locations, farmers are misspelt which affects records."	FGD, Rubanda district, 2025
Data accuracy	Inaccurate GPS/location information	"It could show somebody is in Nyankwazi in Amolatar yet the person is in Kyenjojo."	FGD, Kyenjojo district, 2024
Accessibility of data	Supervisor access to submitted information	"One good thing is that once you upload, your supervisor can get the information."	FGD, Kasese district, 2025
Accessibility of data	Limited access to, and verification of, own submissions	"Once you fill in the information and send, you can't trace what you have sent."	FGD, Kibaale district, 2025
Accessibility of data	Access to extension knowledge resources	"e-Weather helps us to get information on seasonal changes."	FGD, Serere district, 2024
Completeness of data	Limited adaptability of activity records	"The initial activities fed into the system are retained."	FGD, Kasese district, 2025
Completeness of data	Recording of unplanned activities	"Even the unplanned activities that have come in you can record them."	FGD, Oyam district, 2024
Completeness of data	Gaps in production, farmer and sector-specific information	"In crop, the quantity of yield per farmer, maybe even the acreage, should be provided."	FGD, Kasese district, 2025
Completeness of data	Loss of captured data due to application instability	"Some of the output may be lost when the application freezes."	FGD, Serere district, 2024
Completeness of data	Missing information on actors and farmer characteristics	"It would leave out gender and maybe if this farmer is PWD."	FGD, Kyenjojo district, 2024
Completeness of data	Incomplete coverage of sectoral activities	"In the fisheries sector, most of the activities about fish farming were not covered."	FGD, Serere district, 2024
Format of data	Difficulty interpreting uploaded image data	"Field pictures uploaded on the application are hard to interpret."	FGD, Serere district, 2024
Format of data	Generation of quantitative and qualitative information	"The form is a mixture of both qualitative and quantitative; the qualitative helps to qualify the numbers."	KII, MAAIF, 2024
Format of data	Export and query-based report generation	"Excel and Word data can be generated from the application."	KII, MAAIF, 2024
Timeliness of data	Real-time or same-day activity reporting	"You can send the information for the day's activity even from the farm."	FGD, Kibaale district, 2025
		"It facilitates timely reporting of field activities."	FGD, Serere district, 2024
Alignment to user needs	Use of historical information for planning	"We use it to compare with previous seasons when planning."	FGD, Serere district, 2024
Alignment to user needs	Use of captured information to guide field implementation	"It's on actual activities and informs day-to-day activities."	FGD, Kasese district, 2024
Alignment to user needs	Limitations for assessing performance and outcomes	"We cannot assess the impact and individual performance."	FGD, Kyenjojo district, 2024

While 8.9% strongly agreed and 9.3% agreed that the data generated by the E-diary application is in the desired format. Only 0.4% strongly disagreed, and 5.7% disagreed that E-diary generates data in the desired format. In regard to alignment with user needs, more than half (69%) remained neutral, nearly one-fifth (17.6%) agreed and only 9% agreed that the E-diary generated data aligns with their needs. Only 0.4% strongly disagreed, and 4% disagreed that E-diary generated data is aligned to their needs. The mean score of 3.32(SD=0.69) reflects a modest lean towards agreement, indicating that although the generated data is usable, some improvements may be necessary to improve user confidence. The qualitative findings further show that it's hard for extension workers, especially interpreting photographs, and is highly rated by the supervisors at ministry and district levels. Hence, the availability of different data formats does not necessarily mean that every data type is readily interpretable or analytically useful.

Regarding data accessibility, 63.8% of participants were neutral about whether the E-diary application allows easy access to data whenever needed. However, a substantial proportion (33.4%) either agreed (16.7%) or strongly agreed (16.7%) that data access is easy, with very few respondents expressing disagreement (2.4%) and 0.4% expressing strong disagreement. Similarly, the qualitative findings also show mixed feelings about accessibility of data, with some citing that it's hard for them but not their supervisors. However, one of the key informants noted that: "There are those who will not be able to look at all those things because it is not for them." KII MAAIF, 2024. This implies that accessibility to some information is restricted for some users. From the qualitative findings, whereas there are accessibility challenges, some extension workers identified the system's knowledge resources such as e-Weather as useful. To further assess the capacity of the E-diary application, a composite data quality index was generated. The internal consistency of the six-item data comprehensiveness scale was assessed using Cronbach's alpha as shown in Table 4.

Table 3. Internal Consistence of Data Quality Dimensions.

Statistic	Value
Cronbach's alpha	0.911
Standardized alpha	0.915
Number of items	6

The Exploratory Factor Analysis (EFA) using the MINRES extraction was conducted to assess the dimensionality of the six data comprehensiveness indicators. The overall KMO value of 0.866 confirmed sampling adequacy, while factor loadings (0.776-0.845) and communalities (0.603-0.716) supported a single factor structure. Together with high internal consistency (Cronbach's alpha value of 0.911), these findings supported combining the six factors into a composite data comprehensiveness score, calculated as their mean for respondents with at least four valid responses. The composite data quality index results were a composite mean of 3.36 and an SD of 0.62, IQR=0.65 and min=2.17 and a max of 5. This indicates a moderately positive perception of the E-diary application's capacity to generate quality data. However, the median score of 3 suggests that the typical targeted user remains neutral.

DISCUSSION

Results show that both qualitative and quantitative data can be generated by the E-diary. This is very important in monitoring and supervision of agriculture extension service delivery; the quantitative gives the prevalence, while the qualitative supports explanations of the observed prevalence. This not only allows effective diagnosis of the needs and challenges in delivery but also provision of complete feedback for improved performance. Accordingly, some elements can only be measured either qualitatively or quantitatively (Eulerich and Eulerich, 2020) and converting qualitative information such as images into quantitative data is complex (Rogers et al., 2020). Therefore, the generation of both types is critical given the complementary role of each data type. This was noted in one of the focus groups: "We were producing a lot of quantitative reports; the E-diary application helps us to produce qualitative reports with actual figures." FGD Rubanda district, 2025).

The composite quality index had a mean of 3.36 (SD=0.62; IQR=0.65) on a five-point Likert scale, with a median of 3.0. This indicates generally neutral perceptions, with a slight positive inclination. Importantly, this does not establish that the application generates objectively high-quality data. It suggests that respondents did not express strong agreement or disagreement about the overall capacity to generate quality data. However, several extension workers remained neutral on the different aspects of data quality, that is data accuracy, completeness, accessibility, format, timeliness and alignment to user needs. The inaccuracies arise from incorrect spellings of farmer names and wrong location details. Such problems have serious implications for the decisions and interventions made using the data. In fact, this is similar to Miller et al. (2024) argument that in health, inaccurate patient information affects patient care. Similarly, in agriculture, extension service delivery is planned in response to identified farmer needs and who has access to extension services. Therefore, inaccurate data affects the nature of interventions and associated activities. This is emphasised by one of the key informants from the Ministry of Agriculture who noted: "Farmer profiles help to establish the number of beneficiaries and their typologies." (KII MAAIF, 2024). Although Gorur and Dey (2021) reported that in India, teachers would report big numbers for fear of transfers, extension workers complain about spellings and wrong location information. Besides, the fact that the E-diary application requires extension workers to produce evidence of photos can help to address this problem of reporting high numbers, for instance of farmers trained and/or benefiting from a particular intervention. Nevertheless, the use of photographs and other identifying records as supporting evidence raises data governance and

privacy considerations. Photographs may contain identifiable images of farmers, while signatures, names, sex and geolocations can expose farmers. Hence, the use of such evidence should be guided by appropriate safeguards, including informing farmers about the purpose. Also, the requirement for beneficiaries to sign further helps to avoid defects or inaccuracies.

Regarding data completeness there are gaps in the E-diary application which limit the details captured in line with what is required. According to the World health Organization, (2023), all data generation tools tend to have issues of missing information. The incompleteness of data is a serious problem for informed decision-making, as emphasised by one of the key informants: "Incomplete data will always lead to poor planning, and it is so misleading at all levels of executing my duties." (KII Kibaale district2024) and complete data leads to community satisfaction: "Complete data leads to good decisions, implementation and community satisfaction." (KII Kyenjojo district, 2024). However, supervisors at the Ministry of Agriculture, Animal Industry and Fisheries believe that, though improvements are needed, it can provide complete data; for instance, one official noted: "It has extra features like taking location, photo of where the activity is done and allows for capturing all the details including challenges." KII MAAIF, 2024.

In the case of data accuracy, results indicate a mismatch, though neutral responses were dominant. This is because extension workers perhaps find it difficult to timely retrieve information but easily submit what they have captured in the field. With traditional modes of reporting, the extension workers would take a lot of time typing the field captured notes. Hence, even with limited knowledge and practical use, extension workers can confidently score the capacity of the application to improve on timely generation of data. Timely data delivery is critical, especially for agriculture where specific information is needed at a given period of time, such as the rainy season or performing specific value chain functions. In health, timely data is reported to be crucial for managing emergency cases (World Health Organisation, 2023).

For data accessibility and format, the main users are the supervisors of the uploaded data are supervisors at the district and ministry levels. This is perhaps why extension workers remained mainly neutral. However, none of the indicators approaches the upper agreement band (≥4.0), which is commonly interpreted as clear or strong agreement in Likert-based evaluation research (Dolla and Laishram 2020; Salleh et al., 2026). Standard deviations ranged between 0.68 and 0.84. SD values below 1.0 on a 5-point scale are generally interpreted as indicating moderate dispersion rather than extreme variability, an indication of consistency across respondents, though not uniform. Thus, read through the social technical systems theory, the above trend suggests that the E-diary application has been technically deployed but not socially embedded. This is consistent with the theory proposition that data quality is not a fixed technical property but an emergent outcome of technical capability interacting with social use over time.

CONCLUSION

This study focused on the E-diary application's capacity to generate adequate data for monitoring and supervision of extension service delivery. Overall, the E-diary application generates both qualitative and quantitative data. The data originates mainly from farmer trainings, meetings, interviews and observations. The findings further indicate that extension workers generally perceived the E-diary application as having a moderate capacity to generate quality data for monitoring and supervision of agricultural extension service delivery. Although accuracy and accessibility received relatively favourable assessments, completeness and alignment with data needs were comparatively less favourably rated. Hence, while the application provides an important mechanism for capturing data, improvements are needed to ensure that the generated information adequately responds to the data requirements of effective monitoring and supervision. Therefore, there is a need for E-diary developers to incorporate a data quality reviews provision to check for spelling mistakes and incomplete data capture. This will not only improve data accuracy and completeness but also overall data quality. MAAIF should promote use of the E-diary application; this will boost their knowledge and skills, but also provide more constructive criticism to inform adjustments for improved E-diary application efficiency. Finally, future research should focus on establishing the real potential of the application by conducting objective analysis of the actual data generated with paper-based records, and incorporate more data quality dimensions such as reliability, consistency and quantity, among others.

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