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Digitalised Participatory Land Administration and Peasant Livelihoods: Tools for Community Empowerment, Western Region-Ghana

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Abstract

This study, conducted in the Ellembelle District of Ghana's Western Region—a hub of oil and gas activities, examines the land transfer deal between local communities and the ENI oil exploratory company. The research focuses on the level of participatory land administration, the impact on peasant livelihoods, and the relationship between participatory land administration and livelihood outcomes. A total of 300 beneficiaries of the ENI Livelihood Restoration Plan were randomly selected for the study. Data analysis employed frequencies, percentages, means, standard deviations, correlation, and ordinary least square regression. The findings reveal that respondents perceived the level of the digitalised participatory land administration process as inadequate, with low ratings for land policies, institutional arrangements, and land

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information. In contrast, the level of peasant livelihoods after the land transfer was rated as moderately high concerning livelihood assets, resilience to vulnerability, and risk management strategies. A positive and moderate correlation was found between the level of peasant livelihoods and land policies, while a positive but low correlation was observed between livelihoods and demographic factors such as sex, age, educational level, and capacity training. Notably, the study identifies that 97% of the variation in peasant livelihoods can be attributed to a combination of factors, including sex, age, educational level, skill development programmes, and land policy. These findings have significant implications for designing and implementing participatory land administration initiatives aimed at enhancing peasant livelihoods in the context of large-scale land acquisitions.

Keywords: Peasant livelihood, participatory land administration, community empowerment

Résumé

Cette étude, menée dans le district d'Ellembelle dans la région Western du Ghana – un centre d'activités pétrolières et gazières – examine l'accord de transfert de terres entre les communautés locales et la société pétrolière exploratoire ENI. La recherche se concentre sur le niveau d'administration participative des terres, son impact sur les moyens de subsistance des paysans et la relation entre l'administration participative des terres et les résultats en matière de moyens de subsistance. Au total, 300 bénéficiaires du plan de

restauration des moyens de subsistance de l'ENI ont été sélectionnés au hasard pour l'étude. L'analyse des données a utilisé les fréquences, les pourcentages, les moyennes, les écarts-types, la corrélation et la régression des moindres carrés ordinaires. Les résultats révèlent que les répondants ont perçu le niveau du processus d'administration participative des terres numérisé comme inadéquat, avec des notes faibles pour les politiques foncières, les arrangements institutionnels et les informations foncières. En revanche, le niveau des moyens de subsistance des paysans après le transfert de terres a été jugé modérément élevé en ce qui concerne les actifs de subsistance, la résilience à la vulnérabilité et les stratégies de gestion des risques. Une corrélation positive et modérée a été trouvée entre le niveau des moyens de subsistance des paysans et les politiques foncières, tandis qu'une corrélation positive mais faible a été observée entre les moyens de subsistance et les facteurs démographiques tels que le sexe, l'âge, le niveau d'éducation et la formation en capacité. Notamment, l'étude identifie que 97% de la variation des moyens de subsistance des paysans peut être attribuée à une combinaison de facteurs, tels que le sexe, l'âge, le niveau d'éducation, les programmes de développement des compétences et la politique foncière. Ces résultats ont des implications significatives pour la conception et la mise en œuvre d'initiatives d'administration participative des terres visant à améliorer les moyens de subsistance des paysans dans le contexte des acquisitions de terres à grande échelle.

Mots-clés: Moyens de subsistance des paysans, administration participative des terres, autonomisation des communautés.

Introduction

The discovery of oil and gas has the potential to transform the economy of a nation (Otchere–Darko & Ovadia, 2020). However, the literature suggests that petroleum–induced urbanisation challenges indigenous peoples' access to lands governed under the customary tenure, especially regarding commercial land conversion and individualised land use (Ubink & Amanor, 2008). Additionally, factors such as land commercialisation and commodification have been shown to impede the probability of vulnerable groups in society accessing agricultural lands, particularly through traditional means (Adjei, 2017; Barbesgaard, 2018). For example, Ghana's commercial oil discovery in 2007 and subsequent production in 2010 were touted to have had a significant impact on the country's economy, with the oil and gas industry accounting for 3.8% of the country's 7.8% real gross domestic product growth rate in 2019 (Government of Ghana, 2019). However, the oil–induced expansion has not yet yielded the desired effects on Ghanaians' individual livelihoods, with many households struggling to protect their livelihoods in the face of declining fish catches and environmental pressures (Adjei & Overa, 2019). According to Ackah et al. (2019), despite the economic benefits of oil production for nations and individuals, if proper administrative measures are not enforced, the result will be a detrimental effect of oil extraction and production on coastal communities, local livelihoods, and marine ecosystems.

ENI is a global integrated energy company that has been operating in Ghana since 2009, with the Offshore Cape Three Points project producing approximately 80,000 barrels of oil per day (Businessfront, May 30, 2025; Obeng–Odoom, 2014). Although well intended, the project necessitated the acquisition of large tracks of land in the Ellembelle District, primarily in the Sanzule and surrounding settlements, which negatively affected

the livelihoods of over 205 families who relied on the land for their livelihoods (Akwesi, 2019). The project invariably led to land conflicts, gender disparities, disregard for traditional authorities, displacement, food insecurity, increased poverty and lawlessness (bftonline, Jan 2, 2021). In response, ENI oil exploratory company initiated a Livelihood Restoration Plan (LRP) aimed at revitalising income-generating activities and improving the living conditions of affected communities in a sustainable manner (bftonline, Jan 2, 2021). The LRP emphasised the redressing of land acquisition and forced resettlement, aimed at restoring the livelihoods of families through food support, financial training, and the setting up of new sustainable businesses (bftonline, Jan 2, 2021). Further, a committee was set up to investigate how best to operationalise the digitalisation of community participatory land administration in ways that take into consideration favourable land policies, proper institutional arrangements, and easy access to land information. These arrangements were to guide straightforward land transfer processes and positively influence the livelihoods of participating communities (bftonline, Jan 2, 2021).

Nonetheless, the missing link has been questions such as: What are the components of the digitalisation of a community participatory land administration? What are the indicators for measuring sustainable livelihoods for fisherfolk? What is the relationship between the digitalisation of community participatory land administration and peasant livelihood security? What is the best way to operate the digitalisation of participatory land administration to positively influence peasant livelihoods? This paper seeks to address these knowledge gaps by examining the level of digitalisation of participatory land administration used in the land transfer process, the level of peasant livelihoods after the transfer, the relationship between the level of participatory land administration and the level of peasant livelihoods, and the predictors needed to improve the

livelihoods of fisherfolk in the Ellembelle District. The research provides contextualised insights into the gaps and overlaps in this particular land transfer agreement, the digitalisation of participatory land administration, and the livelihoods of fisherfolk as evidenced in the case of ENI and the people of Sanzule.

Land administration and its participatory outcomes in Africa

In Africa, the concept of land administration is complex and influenced by various factors, including customary law, colonial legacy, and modernisation (Chigbu, 2021). Although the precolonial patterns of tribal land ownership were often either patriarchal or matrilinear, the communal structure enabled the protection of the vulnerable, particularly women, in land use (Chigbu, 2021). However, the introduction of individual land ownership and the growth of a free market system of land titles have created high land transaction costs, making it difficult for smallholder farmers, particularly women, to acquire land (Brottem & Ba, 2019). Customary law continues to suppress the rule of law within the constitution and to contest land acts across Africa, destabilising subsistence farming through the introduction of land commodification (Akaateba, 2019). According to a study by the African Development Bank (2019), the lack of secure land tenure and the prevalence of customary law have hindered agricultural development and poverty reduction in Africa. The study found that in many African countries, women have limited access to land and are often excluded from decision–making processes related to land use and management. This has significant implications for food security and sustainable development, as women are often the primary caregivers and agricultural producers in many African households (Food and Agriculture Organization, 2019; United Nations Development Programme, 2019).

In most parts of West Africa, the situation is not different; while the legal framework advocates for equal rights and opportunities to resources, gender discriminatory customary practices prevent rural women, primarily peasant farmers, from inheriting or owning land (Ndi, 2017). A study on the implications of gender discriminatory customary practices regarding land ownership found that customs have a strong influence and impact on land tenure systems, affecting women's land rights, food security, and sustainable development (Fonjong et al., 2013). Fonjong et al. (2013) found that in many West African countries, women are excluded from decision-making processes related to land use and management and are often forced to rely on their husbands or male relatives for access to land. A study by the West African Regional Development Association (2018) corroborated that in West Africa, customary law and social norms often limit women's access to land. This has critical implications for women's economic empowerment and poverty reduction, as women often play pivotal roles in household caregiving and agricultural production in West Africa (Food and Agriculture Organization, 2019; United Nations Development Programme, 2019). However, some authors provide a positive outlook, highlighting the increasing claims made by women over customary land in Sub-Saharan Africa (Fonjong et al., 2013).

In Ghana, the politics of customary land rights transformation in peri-urban areas is a significant concern (Akaateba, 2019). The state and market powers are mutually reinforcing regarding the politics of exclusion and the transformation of customary land rights in peri-urban Ghana, leading to the loss of land rights and agrarian livelihoods for indigenes (Akaateba, 2019). Powerful chiefs and public bureaucrats, as well as prospective developers with capital, hijack and benefit from the proceeds of peri-urban land conversions (Akaateba, 2019). According to a study by the

Ghana Land Authority (2019), the dearth of secured land tenure and the prevalence of customary law have hindered agricultural development and poverty reduction in Ghana. In the Western Region of Ghana, the land administration system is characterised by a mix of customary and statutory laws, leading to conflicts and disputes over land ownership and use (Adjei, 2017). Furthermore, a study by the Ghana Statistical Service (2020) found that most women (63.4%) in the Region do not own land, while most men (71.1%) do. The study also found that customary law, ill-equipped public land law enforcement agencies, and social norms often limit access to land. Therefore, the participation of local communities in land administration is crucial to ensuring that their rights and interests are protected, particularly in the face of large-scale land acquisitions and investments (Njoh et al., 2018).

Conceptualising a digitalised participatory land administration and peasant livelihood security

The land administration theory asserts that good land administration supports economic development by providing tenure security, revenue generation, and the utilisation of land capitals that would otherwise remain hidden. Similarly, the land tenure theory establishes a positive relationship between tenure security and levels of economic performance through efficient investments in lands. To best operationalise participatory land administration to positively influence peasant livelihoods in the case of Eni and the people of Sanzulle, the 3Ps dimension framework, which consists of the "people dimension, process dimension, and practice dimension" was identified. The "people dimension" focuses on land policy and its impact on customary rights, gender, and capacity building by examining how land policies and laws affect the livelihoods of peasants, particularly in terms of their access to land, tenure

security, and ability to participate in decision-making processes. The "process dimension" examines the institutional arrangements that govern land administration, including legal, institutional, and spatial indicators frameworks, assessing how these arrangements facilitate or hinder the participation of peasants in land decision-making processes and the impact on their livelihoods. The "practice dimension" focuses on land information and its impact on technology, cadastral systems, and land tenure security, exploring how the use of technology, such as geographic information systems and land information systems, can improve land administration and promote more efficient and effective use of land.

The 3Ps dimension framework is contextualised to consider the existing policies, institutions, processes, and stakeholders that affect peasant livelihoods, aiming to enhance peasant capacity to improve their livelihoods by strengthening their livelihood assets, building their resilience to shocks, seasonality, and trends, and developing effective risk management strategies. The 3Ps dimension framework is designed to contribute to the development of a more effective and participatory land administration system that promotes the livelihoods of peasants and supports sustainable economic development. By using this framework, it is possible to identify the key factors that influence peasant livelihoods and to develop targeted interventions that address these factors, ultimately leading to improved livelihood outcomes for peasants and more sustainable economic development. The framework is also flexible and adaptable, allowing it to be applied in different contexts and to be modified as needed to reflect changing circumstances and new information. Overall, the 3Ps dimension framework provides a useful tool for analysing and addressing the complex issues surrounding land administration and peasant livelihoods, and for promoting more effective and sustainable development outcomes. Digitalisation of land administration in

the context of participatory land administration and peasant livelihoods involves integrating digital technologies and participatory approaches to enhance the efficiency, transparency, and inclusivity of land administration, leveraging tools such as digital platforms for community engagement, capacity–building programmes, digital land registries, Geographic Information System (GIS), Land Information System (LIS), and mobile applications to promote more sustainable and equitable land management.

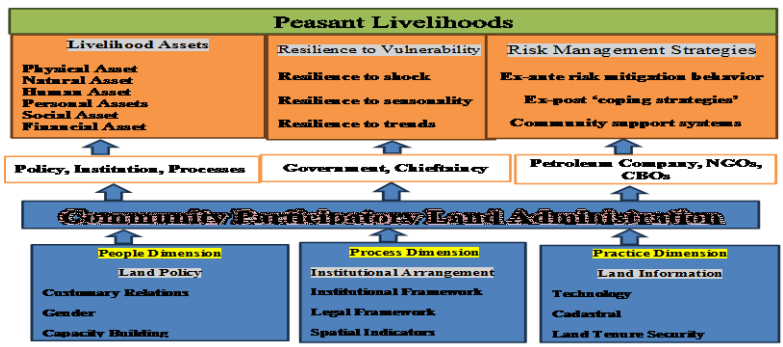

Fig. 1: Land digitalisation and outcomes for participation for social groups: a conceptual framework

Source: Author's construct.

Methods

Study area

The Western Region of Ghana is a significant fishing hub, with the Jubilee Oil Field located approximately 60 kilometres southwest of the coastal communities in the region. The oil field covers an area of 110 square kilometres and has a profound impact on the livelihoods of the people living in the surrounding communities who primarily rely on farming and fishing for their sustenance. The Ellembelle District, which is one of the 261 Metropolitan, Municipal, and District Assemblies in Ghana, is situated in the southern part of the Western Region and spans an area of approximately 1,468 square kilometres, accounting for about 9.8% of the region's total land mass. The district, which was established in December 2007, has its capital in Nkroful and shares borders with the Jomoro Municipal to the west, Amenfi West Municipal to the north, Nzema East Municipal to the south-east, Tarkwa-Nsuaem Municipal to the east, and a 70-kilometre stretch of sandy beaches to the south. The district's geography and demographics are characterised by a diverse range of features, including its coastal location, agricultural land use, and significant natural resources, which have important implications for the livelihoods and well-being of its inhabitants.

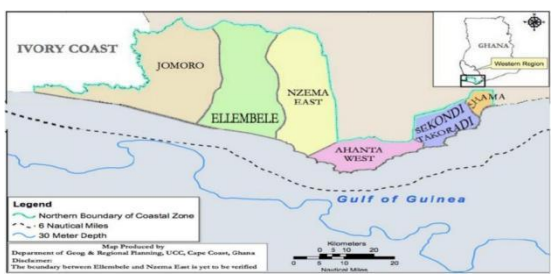

Fig. 2: Map of study area

Source: Department of Geography and Regional Planning, University of Cape Coast, Ghana

Research design, population, sample, and sampling procedure

The research used a descriptive correlation survey approach to examine the relationship between the independent variable (Participatory Land Administration) and dependent variable (Livelihood) and to identify the best predictor(s) of the dependent variable among the independent variables. A questionnaire of seven sections was used to collect data for analysis. Part A focused on demographic variables, including sex, age, years of experience, and capacity–building training obtained. Parts B, C, and D aimed to investigate how beneficiaries perceive the level of Participatory Land Administration employed. Parts E, F, and G examined how beneficiaries perceived their level of livelihoods. Parts B to G were solicited using a 5–point Likert–type scale ranging from 1 (very low) to 5 (very high). According to the Krejcie and Morgan sampling table, the population of 1400 beneficiaries will require a response sample of 300 peasant farmers (Krejcie & Morgan, 1970). The surveys were conducted in English and local languages by the researcher and two research assistants. Respondents were selected using random sampling techniques because the sample frame obtained from the ENI Livelihood LRP had been stratified according to the four main capacity building training given to beneficiaries pertaining to Agriculture, Technical/Vocational, Value Addition, and Services.

Table 1. Sampling Table

Zone	Population (N)	Sample population
Agriculture	555	119
Vocational	434	93
Value Addition	243	52
Services	168	36
Overall	1400	300

Source: Field Survey Data (2023).

Data collection

Before actual data collection, a pre-test of the questionnaire on 30 peasants in an analogous district was done to evaluate its validity. This pre-test helped identify ambiguities in the questionnaire, allowing for necessary adjustments. The reliability related to the Cronbach's alpha test yielded a score of 0.73, indicating the questionnaire's validity. The main data collection was conducted in August 2023, with the assistance of two research assistants. All hypotheses were tested at a significance level of 0.05 alpha, focusing on significant differences and relationships. Data was evaluated using the Statistical Package for Social Sciences (SPSS), version 26.

Data analysis

To assess how participatory land administration influences peasant livelihood security, a five-point Likert scale was employed (1.00-1.44 = very low; 1.45-2.44 = low, 2.45-3.44 = moderate, 3.45 – 4.44 = high, and 4.45 – 5.00 = very high). Descriptive statistics (means and standard deviations) were used to analyse the findings. Correlational coefficients (Point Biserial, Spearman rho, and Pearson) were run to assess the relationship between participatory land administration and peasant livelihood security. To assess the best predictors of participatory land administration on peasant livelihood security, ordinary least square (OLS) regression analysis involving the stepwise entry method was employed.

The regression equation used was $Y = a + \beta_7 X_7 - \beta_5 X_5 + \cdots . \mathcal{E}$, where Y = peasant livelihood security, a = constant, $\mathcal{E}$ = Error term, and Xn = community participatory land administration.

Evidence and outcomes of land digitalisation for participation

Demographic and work characteristics that informed the digitalisation process

Table 2 displays the demographic characteristics of the ENI LRP beneficiaries in the research region. In terms of gender distribution, most respondents (77.3%) were men, while only a minority (22.7%) were female farmers. Ankrah (2020) confirmed male dominance in farming in a study in southern Ghana. Table 2 demonstrates that most respondents (61.6%) were aged between 21 and 30, implying the involvement of youthful participants in the ENI LRP. According to the Food and Agricultural Organization (2020), youth is a key component and their involvement in decision-making processes is crucial to ensure peace and stability in local communities. Again, the majority (87%) of the beneficiaries had primary to secondary education.

Table 2. Demographic and Work Characteristics Influencing the Digitalisation Process

Variables	Categories	Frequency	Percentage
Sex	Male	232	77.3
	Female	68	22.7
Age	21–30	204	68.0
	31–40	81	27.0
	41–50	15	5.0
Level of Education	Primary	183	61.0
	Secondary	78	26.0
	Tertiary	39	13.0
Skill Development Program	Agriculture	119	33.3
	Vocational	93	33.3
	Value Addition	52	33.3
	Services	36	2.8

Source: Field Survey Data (2023).

This is in line with Gifty-Maria et. al (2023) who observed that most farmers have little to no formal education.

Table 2 identifies the four main capacity-building trainings given to beneficiaries as Agriculture, Technical/Vocational, Value Addition, and Services respectively. This practice aligns with the findings of the Food and Agricultural Organization (2020) report, which shows that tailored training enhances performance and therefore underscores the need to develop detailed modules for stakeholder capacity development.

Digitalisation of Land Policy In Terms Of Customary, Gender, and Capacity Building at the "People Dimension"

Table 3 shows that the overall rating of land policy was low (x=1.83, std=0.63) with slight variations from the responses indicating that when it comes to the digitalisation of land administration, capacity building, gender, and customary leadership are essential factors to be considered for proper land policy formulation. Omer and Kassahun (2019) reiterated that the place of functioning customary institutions is crucial for success in managing tenure rights and ensuring that land governance practices are based on both statutory and customary laws. Thus, the level of the community's respect for their traditional leaders guarantees that outsiders do not infringe on community rights (Kassa et al., 2017). A study by Ukeje et al. (2002) on the impact of oil extraction on women in six Nigerian oil towns revealed that oil-related activities, including land grabs for company use, had led to a decline in women's access to farming and fishing grounds. Food and Agricultural Organization (2020) confirmed the importance of capacity building affirming that the lack of training programmes on alternative livelihoods in land governance creates a major obstacle to sustainable tenure governance

Table 3. Digitalisation Of Land Policy In Terms Of Customary, Gender, And Capacity Building

Components of Customary Related Item	Mean (x)	Std. Dev.
The clarity in customary rights to assist with administration	1.99	0.76
The clarity in the identity of customary Authority	1.94	0.82
Recognition of customary rights	1.77	0.83
The clarity in boundaries of customary authority	1.72	0.88
Reassured group rights to make clear what land is available	1.71	0.82
Overall Rating of Customary Related Item	1.82	0.67
Components of Gender–Related Item	**Mean (x)**	**Std. Dev.**
Integrated gender land rights	1.97	0.88
Joint titling is in principle supported	1.86	0.74
Women's access to opportunities associated with secured tenure	1.84	0.69
Strengthened gender–sensitive land claims	1.80	0.84
Strategies to address the issue of women's access to land	1.71	0.77
Overall Rating of Gender–Related Item	1.84	0.67
Component of Capacity Building Item	**Mean (x)**	**Std. Dev.**
Education programme on effective resource utilisation	1.96	0.74
Improvement of infrastructure for modern agriculture	1.90	0.77
Investment knowledge	1.83	0.81
Technical assistance in optimising land use	1.78	0.86
Training activity on alternative livelihood	1.72	0.81
Overall Rating of Capacity Building Item	1.84	0.66
Overall Rating of Land Policy (People Dimension)	1.83	0.63

Source: Field Survey Data (2023).

Digitalisation of Institutional Arrangement In Terms Of Institutional, Legal and Spatial Indicators Framework at the Process Dimension

Table 4 shows the overall low rating of institutional arrangements (x=1.90, std=0.70) with a slight variation in the responses, highlights that in respect of the digitalisation of lands, there is a need for systems that allow the integration of built and natural environmental data (cadastral data) that permits the aggregation of land information from local to national levels by considering all institutional, legal, and spatial indicators framework. Tadesse et al. (2017) noted the importance of involving formal and informal structures that have been established to support land digitalisation decision-making processes to help contextualise decisions made on behalf of the majority. For example, stimulated responsiveness places service delivery at the level closest to the people, while good support for accountability shows stewardship by answering inquiries and making decisions in accordance with laws and regulations (Hailemariam, Soromessa, & Teketay, 2015).

Table 4. Respondents Perceived Level of Institutional Arrangement (Process Dimension)

Component of Institutional Framework Item	Mean (x)	Std. Dev.
Stimulated responsiveness	1.99	0.77
Strengthened participation	1.95	0.87
Encouraged transparency	1.85	0.87
Encouraged subsidiarity	1.82	0.91
Support for accountability	1.81	0.85
Overall Rating of Institutional Framework Item	**1.88**	**0.70**
Component of Legal Framework Item	Mean (x)	Std. Dev.
Appropriate time is taken to resolve land disputes	1.99	0.91
Acknowledgment of rights recognised informally	1.95	0.80
Safeguards for vulnerable groups	1.90	0.87
Encouraged land dispute resolution	1.89	0.93
Recognition of rights recognised formally	1.78	0.82
Overall Rating of Legal Framework Item	**1.90**	**0.72**
Component of Spatial Indicators Item	Mean (x)	Std. Dev.
Accurate determination of unit cost of systematic land title	1.98	0.88
Calculation of time to produce a certified copy of the land title	1.97	0.91
Identification of the percentage of total parcels registered	1.93	0.87
Validation of the percentage of transfers that are registered	1.91	0.89
Verification of total ongoing land–related court cases	1.85	0.84
Overall Rating of Spatial Indicators Item	**1.90**	**0.72**
Overall Rating Institutional Arrangement (Process Dimension)	1.90	0.70

Source: Field Survey Data (2023).

Hence, in the digitalisation process, it is necessary to establish contacts with sector service providers like notaries, attorneys, or surveyors in estimating the total number of registered parcels lawfully registered in order to bring authenticity to the total number of systematic land titles and

land-related court proceedings (Admasu et al., 2013). According to Engida and Mengistu (2013), conflict resolution measures, clear channels of information flow, evaluation of the number of land disputes and the length of time it takes to resolve land issues should be integrated into the land digitalisation process ahead of time.

Digitalisation of Land Information In Terms Of Technology, Cadastral, And Land Tenure Security at the Practice Dimension

The result from Table 5 shows that the overall rating of land information (practice dimension) was rated as low (x=2.00, std=0.72) with a slight variation from the responses, denoting that in land digitalisation, the involvement of affected landowners and local communities is a prerequisite for the successful mapping and recording of land rights. According to Enemark et al. (2008) and Kassa (2017), successful land digitalization requires selecting technologies and methodologies that are proportionate to the task, neither overly complex nor too simplistic. The chosen approach should be sufficient, scalable, and secure, enabling a well-functioning land market while accommodating future needs and adjustments.

Table 5. Respondents Perceived Level Of Land Information (Practice Dimension)

Component of Technology Related Item	Mean (x)	Std. Dev.
Accessibility	2.14	0.88
Simplicity	2.09	0.83
Sustainability	2.04	0.88
Timeliness	1.91	0.92
Security	1.88	0.92
Overall Rating of Technology–Related Item	2.01	0.74
Component of Cadastral Related Item	Mean (x)	Std. Dev.
Finalised land use plan	2.10	0.82
Agreement on broad zoning for land uses	2.07	0.78
Land boundaries established	2.03	1.04
Action plans for the management of land use	1.98	0.91
Updated land base maps	1.95	0.87
Overall Rating of Cadastral Related Item	2.02	0.74
Component of Land Tenure Security Item	Mean (x)	Std. Dev.
Respect for durable shared value	2.14	0.84
Monitored stakeholder welfare	2.10	0.87
Encouraged sustainable resource use	1.93	0.89
Investments in food security	1.87	0.99
Compensation law enforced	1.86	0.82
Overall Rating of Land Tenure Security Item	1.98	0.74
Overall Rating of Land Information (Practice Dimension)	2.00	0.72

Source: Field Survey Data (2023).

Asiama, Bennett, and Zevenbergen (2017) specified that demarcation strategies that involve participation and are methodically executed help to provide a more enduring system of land administration by ensuring that results are legitimate and acceptable. Enemark et al (2014) gave an example of how land digitalisation enables spatial integrity through cadastral maps that are updated by cadastral surveys to guarantee the security of tenure by documenting land rights in a land registry. The authors confirmed the importance of an understanding system of tenure transfers that promotes progressive tenure

upgrading and land transfers in the regularisation of property rights that are administratively protective, rather than harsh legal actions of forceful evictions.

Digitalisation of Participatory Land Administration In Terms Of Land Policy (People Dimension), Institutional Arrangement (Process Dimension), and Land Information (Practice Dimension)

The result from Table 6 shows that the overall rating of participatory land administration was rated low (x=2.00, std=0.72) with a slight variation from the responses. The evidence graphically illustrates that land digitalization in Ghana typically operates at a superficial level of citizen engagement, with limited to no meaningful participation from stakeholders across different levels. Arnstein (1969) described citizens' tokenism as the level where authorities just teach communities about their rights, obligations, and options and encourage them to express their views on the matter, but do not give them the authority to affect decisions. However, the most ideal type of community engagement is known as citizen power, where participants make decisions about problems that are important to them and have a say in decisions that have an impact on their daily lives, because communities at this level exercise the greatest amount of practical influence and control over the matters that affect their future (Arnstein, 1969).

Table 6. Respondents Perceived Level Of Land Information (Practice Dimension)

Project-based extension delivery	Mean (x)	Std. Dev.
Overall Rating of Land Information (Practice Dimension)	2.00	0.72
Overall Rating Institutional Arrangement (Process Dimension)	1.90	0.70
Overall Rating of Land Policy (People Dimension)	1.83	0.63
Overall Rating of Land Information (Practice Dimension)	1.98	0.68

Source: Field Survey Data (2023).

Beneficiaries' Perceived Level Of Their Livelihood Assets In Terms Of Overall Physical, Natural, Financial, Personal, Human And Social Asset Item

The results from Table 7 show that livelihood assets were rated as being moderate (x=2.62, std=0.41) with a slight variation from the responses. This implies that beneficiaries need a variety of assets to achieve successful livelihood outcomes as no single type of asset by itself can produce all the different types of livelihood outcomes that people seek. The absence of physical assets is a fundamental aspect of poverty as it prevents individuals from meeting their basic needs, reducing productivity and livelihoods (Ashley & Carney, 1999; Tadesse, 2017). Physical assets, such as agricultural inputs and good roads, influence productivity and market competitiveness through modest pricing (Transport Research Laboratory, 1999). According to Brock (1999), environmental services and natural resources are essential for livelihoods. Ashley (2000) reiterated that degraded land with depleted nutrients is less valuable than fertile land, affecting productivity and livelihood outcomes. Human capital, including skills, knowledge, and health status, affects the quantity and quality of labour available, influencing household livelihood outcomes (Ellis, 2000). Human capital is a prerequisite for utilising other types of assets (Turton, 2000; Jones et al., 2024).

Table 7. Beneficiaries' Perceived Level Of Their Livelihood Assets

Component of Natural Asset Item	Mean (x)	Std. Dev.
Access to irrigable land	2.74	0.64
Access to adequate farmland	2.74	0.72
Access to collateralisable land	2.62	0.66
Access to potable water	2.58	0.60
Access to productive soil	2.55	0.64
Overall Rating of Natural Asset Item	2.64	0.65
Component of Human Asset Item	Mean (x)	Std. Dev.
Access to indigenous managerial skills	2.76	0.65
Access to affordable labor	2.70	0.66
Access to local farm knowledge	2.58	0.71
Access to employable skills	2.56	0.65
Access to extension service	2.55	0.66
Overall Rating of Human Asset Item	2.63	0.66
Component of Personal Assets Item	Mean (x)	Std. Dev.
Access to mental well-being	2.74	0.70
Access to physical well-being	2.72	0.61
Access to motivational actuality	2.67	0.65
Access to self-confident realism	2.58	0.59
Access to emotional well-being	2.45	0.61
Overall rating	4.87	0.33
Social Capital	Mean	Std. Dev
Access to local self-help organisation	2.64	0.67
Access to local political institutions	2.63	0.66
Access to trusted relationship	2.60	0.59
Access to cooperative societies	2.48	0.64
Access to partnership	2.44	0.65
Overall Rating of Social Asset Item	2.56	0.46
Component of Financial Asset Item	Mean (x)	Std. Dev.
Access to saving cooperation	2.79	0.67
Access to profit-making ventures	2.70	0.66
Access to revenue-making service	2.62	0.71
Access to investment packages	2.61	0.69
Access credit facilities	2.49	0.66
Component of Financial Asset Item	2.63	0.50
Overall Rating of Livelihood Assets	2.62	0.41

Source: Field Survey Data (2023).

Personal assets, including mental health and emotional well–being, are crucial for farmers' motivation, productivity, and overall well–being (Hulme, 1998; Aniah et al., 2019). Farmers may experience emotional stress, aggravation, and anxiety due to market volatility, crop failures, and financial constraints, affecting their livelihood outcomes (Smith et al., 2021). Social capital, built on mutual trust and reciprocity, can reduce collaboration costs and enhance economic ties, boosting wages and savings rates (DFID, 2000; Oteng, 2020). In the absence of formal financial markets, rural households rely on savings and unofficial credit markets to cope with income variations (Paxson, 1992; Yang et al., 2018). The absence of physical assets, environmental degradation, and lack of human, personal, and social capital exacerbate poverty, emphasising the need for policymakers to implement sustainable livelihood strategies, invest in rural infrastructure, promote human capital development, and foster social capital and financial inclusion to improve productivity, livelihood outcomes, and overall well–being (Jones et al., 2024).

Beneficiaries' Perceived Level Of Resilience In Terms Of Shock, Seasonality, And Trends

The result from Table 8 shows that the overall rating of resilience is moderate (x=2.64, std=0.45) with a slight variation from the responses. This suggests that beneficiaries of the project had little to no control over the trends, shocks, and seasonality during and after the COVID–19 pandemic. Critical trends, shocks, and seasonality have a profound impact on people's livelihoods and the availability of assets, as individuals have limited control over these factors (Kabubo–Mariara, 2013). Poor individuals are particularly vulnerable to shocks, whether predictable or not, due to the fragility of their means of subsistence, making them less able to manage or mitigate these

shocks (Devereux, 2001). Growing populations and increasing resource demands exacerbate the impact of unaddressed shocks, further marginalising underprivileged groups, destroying assets, and forcing people to abandon their homes and dispose of essential assets (Adams & He, 1995; Oteng, 2020). Conflict can have devastating effects on the livelihoods of the poor, exposing them to lawlessness and physical harm (Ellis, 1998). Shockwaves, such as harvest failures, natural disasters, and economic downturns, can also severely impact the livelihoods of the very poor (Devereux, 2001). Seasonal variations in prices, employment opportunities, and food supply are a significant source of hardship for the poor in emerging nations (Abdulai, 2020). Disease outbreaks, such as COVID-19, and climate change can alter food prices and cause volatility in resource availability (Oteng, 2020). Trends, although more predictable, can have a substantial impact on the rates of return to selected livelihood strategies (Yang et al., 2018). New technologies can be highly beneficial to the poor (Reardon, 1997), while changes in international commodity prices can affect those involved in commodity production, processing, or export (Tadesse, 2017). Policymakers must acknowledge the vulnerability of poor individuals to critical trends, shocks, and seasonality, and implement strategies to enhance resilience, such as social protection programs, climate-smart agriculture, and access to finance, technology, and markets, to mitigate the impact of these factors on livelihoods and asset availability.

Table 8. Beneficiaries' Perceived Level Of Resilience

Component of Resilience to Shock Item	Mean (x)	Std. Dev.
Resilience to civil conflict shocks	2.76	0.71
Resilience to human well–being shocks	2.70	0.59
Resilience to harvest shocks	2.63	0.69
Resilience to natural disaster shocks	2.54	0.67
Resilience to economic melt–down shocks	2.51	0.64
Overall Rating of Resilience to Shock Item	2.62	0.49
Component of Resilience to Trends Item	Mean (x)	Std. Dev.
Resilience to swaying technology transfer	2.79	.70
Resilience to vacillating market share	2.77	.73
Resilience to skeptic government bureaucracy	2.60	.68
Resilience to capricious political reform	2.56	.69
Resilience to fledging domestic debts	2.49	.68
Overall Rating of Resilience to Trends Item	2.64	0.49
Component of Resilience to Seasonality Item	Mean (x)	Std. Dev.
Resilience to epidemic outbreaks	2.75	0.71
Resilience to proceed variability	2.74	0.67
Resilience to resource fluctuation	2.60	0.67
Resilience to price volatility	2.59	0.68
Resilience to climate change	2.59	0.66
Overall Rating of Resilience to Seasonality Item	2.66	0.50
Overall Rating of Resilience	2.64	0.45

Source: Field Survey Data (2023).

Beneficiaries' Perceived Level of Risk Management Strategies In Terms Of Ex-Ante Risk Mitigation Behaviour, Ex-Post Coping Strategies and Community Support Systems

The result from Table 9 shows that the overall risk management strategies were rated as moderate (x=2.66, std=0.53) with a slight variation from the responses. This implies that beneficiary households experiencing food shortages were forced to trade off short–term consumption needs against longer–term economic viability, which is determined not only by the effectiveness of the strategy in bridging the food gap. Davies (1996) distinguishes between adaptation and coping strategies,

defining coping strategies as short-term responses to unusual food stress, while adaptive strategies are permanently incorporated into the normal cycle of activities. Simply put, coping strategies respond to negative occurrences or shocks, whereas adaptive strategies address negative trends or processes (Corbett, 1988).

Table 9. Beneficiaries' Perceived Level of Risk Management Strategies

Component of Ex-ante Risk Mitigation Behaviour Item	Mean (x)	Std. Dev.
Adaptation of strategies to climate change	2.71	0.67
Mitigate the consequences of climate change	2.69	0.77
Use of early maturing crop	2.68	0.71
Reduce emission of gases	2.54	0.71
Practice of sustainable farming	2.54	0.71
Overall Rating of Ex-ante Risk Mitigation Behavior Item	2.63	0.53
Component of Ex-post 'Coping Strategies' Item	Mean (x)	Std. Dev.
Reduction in Migration	2.81	0.69
Reliance on less expensive foods	2.77	0.76
Reduced daily meals	2.69	0.68
Hunt and gather wild food	2.65	0.74
Off-farm jobs	2.63	0.73
Overall Rating of Ex-post 'Coping Strategies' Item	2.70	0.54
Component of Level of Community Support Systems Item	Mean (x)	Std. Dev.
Support from friends	2.78	0.76
Purchase food on credit	2.71	0.74
Restricted consumption of food by adults so little children can feed	2.67	0.72
Support from relief programmes	2.61	0.75
Send household members to eat elsewhere	2.54	0.67
Overall Rating of Community Support Systems Item	2.67	0.49
Overall Rating of Risk Management Strategies	2.66	0.53

Coping mechanisms are crucial for the poor, who are extremely vulnerable to income shocks due to inadequate wages and lack of asset buffers (Davies, 1996). However, these ex-ante risk management measures are economically inefficient, prioritising lower but less variable yields over yield maximisation,

which hinders agricultural and economic progress (Evans & Ngau, 1991; Siraj, 2018). In the absence of input finance and crop insurance markets, households relying on rainfed agriculture reduce production risk by selecting risk–reduction strategies, such as growing low–risk but low–yield crops (Kassa, 2017; Rakodi, 1999). Coping behaviours, although based on survival strategies, reflect economic destitution and an inability to cope (Corbett, 1988; Oteng, 2020). Corbett (1988) and Abdulai (2020) identify three stages of rising desperation: depletion of insurance mechanisms (e.g., savings), sale of productive assets, and destitution behaviour (e.g., distress migration). However, this study found a reduction in migration, despite it being the highest exhibition of destitution behaviour (Abdulai, 2020; Corbett, 1988). Community support systems, including informal safety nets, enable the poor to rely on social networks for support during times of need (Devereux, 1999). Informal safety nets involve non–market transfers of commodities and services between families and are a subset of coping methods used in response to livelihood shocks, as the poor have limited access to other types of assets (Moser, 1998). Policymakers should develop and implement sustainable livelihood strategies that integrate adaptive and coping mechanisms, risk management programmes, and social protection policies that enhance the resilience of poor households to shocks and stresses and promote economic progress and well–being.

Beneficiaries' Perceived Level of Livelihoods In Terms Of Livelihood Assets, Resilience, Andrisk Management Strategies

The result from Table 10 shows that the overall rating of livelihood was rated as moderately high (x=2.66, std=0.53) with a slight variation from the responses. This indicates that sustainable lifestyles put people at the centre of development in a way that causes them to start thinking about their goals,

scope, and priorities for individual and collective development, boosting the effectiveness of development aid (Aniah et al., 2019; Tacoli, 1998). Again, the high rating of risk management strategies (x=2.66, std=0.53) and lowest overall rating of livelihood assets (x=2.62, std=0.41) denote that the context of vulnerability can be reduced by giving people access to particular resources or elements that combat poverty and help them to pursue advantageous livelihood outcomes. Such access influences the assets they can combine and use in their pursuit of those outcomes or their available livelihood strategies, enabling them to satisfy their own livelihood goals (Evans et al., 1991; Oteng, 2020). Policymakers should prioritise sustainable livelihood approaches that empower individuals and communities to set development goals, manage risks, and access resources, thereby reducing vulnerability and poverty and promoting the effective use of livelihood assets to achieve desirable outcomes.

Table 10. Respondents Perceived Level Of Overall Livelihood

Livelihood	Mean (x)	Std. Dev.
Overall Rating of Risk Management Strategies	2.66	0.53
Overall Rating of Resilience	2.64	0.45
Overall Rating of Livelihood Assets	2.62	0.41
Overall Rating of Livelihood	2.66	0.53

Source: Field Survey Data (2023).

Relationships between the Participatory Land Administration and Livelihoods

Pearson product-moment correlation matrix was used to test the relationship between Participatory Land Administration and Livelihoods. The Pearson product-moment correlation matrix for the research variables is presented in Table 11. Correlation coefficient (r) was interpreted according to the guidelines recommended by Davis (1971) which is scaled as 1.0 = Perfect, 0.70-0.9 = Very High, 0.50-0.69 = Substantial, 0.30-0.49 = Moderate, 0.10-0.29 = Low and 0.01-0.09 = Negligible.

Table 11. Correlation Matrix of Participatory Land Administration and Livelihoods

Independent variables	Correlation Coefficient(r)	Significance (p)	Type of Correlation	Strength of Relationship
Sex (X_1)	0.21**	0.00	Point Biserial	Low
Age (X_2)	0.16**	0.00	Biserial	Low
Land Policy (X_5)	0.38**	0.00	Pearson	Moderate
Institutional Arrangement (X_6)	0.28**	0.00	Pearson	Low
Land Information (X_7)	0.27**	0.00	Pearson	Low

Source: Field Survey Data (2023).

A moderate significant relationship was found between livelihood and land policy ($r = 0.38^{**}$, $p < 0.01$), highlighting the importance of land policy in supporting the livelihood of local fishermen (Davis, 1971). This finding is consistent with Tsikata's (2009) assertion that quality livelihood requires efficient and effective land policy formulation and implementation. However, the relationships between livelihood and sex ($r = 0.21^{*}$, $p < 0.01$), age ($r = 0.16$, $p < 0.01$), institutional arrangement ($r = 0.28$, $p < 0.01$), and land information ($r = 0.27^{*}$, $p < 0.01$) were positive but low. These findings suggest that while these factors have a significant relationship with livelihood, their impact is relatively limited. The positive relationship between livelihood and sex indicates that both males and females face labour constraints that can affect their livelihood assets (Oluwaniyi, 2011). However, women often face additional challenges, such as low wages and limited access to financial resources, which can exacerbate their vulnerability to poverty (King, 2010; Tadesse et al., 2017). The relationship between livelihood and age reinforces the finding that age is a determinant in land administration, with elder traditional leaders and investors predominantly involved in land sales (Tsikata & Yaro, 2014). Natural resource development can lead to land loss, increased poverty, and food insecurity, particularly for younger generations (Chindo, 2011). The positive relationships between livelihood and institutional arrangement

and land information align with the assertion that land laws and rights can redefine land use and give national goals precedence over community-based uses (Ndubuisi, 2013). However, good land administration should empower community members, rather than make them dependent on external decision-making organisations (Karanjaa, 1991; Wanyeki, 2003). Policymakers should prioritise the development and implementation of effective land policies that support the livelihoods of local communities, particularly vulnerable groups such as women and youth, by promoting equitable access to land, financial resources, and decision-making processes, and ensuring that land administration empowers community members, rather than perpetuate dependence on external organisations.

Ordinary Least Square Regression of Participatory Land Administration and Livelihoods

Table 12 shows that the OLS regression of the influence of the components of participatory land administration on peasant livelihood were sex, age, educational level, capacity training and land policy (97%). A seven-factor linear regression model was used to project predictive capacity of the participatory land administration on peasant livelihood. The Ordinary Least Square (OLS) regression was used in a stepwise entry to analyse the data using the Software Package for IBM SPSS version 21.0 for analysis. According to Shah and Goldstein (2006), OLS regression is a reliable technique for analysing the relationship between variables. Another useful approach is the stepwise method, an automated variable selection technique that identifies the optimal subset of independent variables for multiple regression models (Smit, 2018). The stepwise method offers several benefits, including its ability to capture the complexity of real-world phenomena and the unique contributions of individual independent variables. However, a significant drawback of this approach is the difficulty in

interpreting and communicating the results, particularly when dealing with a large number of independent variables (Smit, 2018).

Table 12. Ordinary Least Square Regression Of Participatory Land Administration On Livelihood

Predictors	Step of Entry	Beta(β) (standardised)	R^2	Adj R^2	AdjR^2 Change	S.E.E	F. Change	t value	F. Sig*
X5	1	0.34	0.91	0.91	0.909	0.81	299.03		0.00
X1	2	0.24	0.96	0.96	0.047	0.57	312.4		0.00
X4	3	0.13	0.96	0.96	0.008	0.51	68.4		0.00
X2	4	0.19	0.97	0.97	0.005	0.47	47.94		0.00
X3	5	0.15	0.97	0.97	0.002	0.46	15.24		0.00

Source: Field Survey Data (2023)

*p<0.05 Sex (X1), Age (X2), Level of education (X3), Capacity Training (X4), Land Policy (X5)

Findings in Table 12 show that the first overall best predictor, being Land Policy (X5), gave (91.0%) explanation of the effect of participatory land administration on the level of livelihood. This suggests that beneficiaries know the importance of participatory security and stability measures. King (2010) and Tadesse et al. (2017) stated that land policies committed to ethics offer livelihood stability, freedom from crime, and tolerance while enabling citizens to engage in land governance. The results showed that sex (X1) accounted for 4.7% of the effect of participatory land administration on livelihood levels. This suggests that land administration should strive for gender balance, as both men and women play crucial roles in household responsibilities, including providing food and paying for children's

education (King, 2010). Research by Overa (2007) in Accra, Ghana, found that husbands typically provided wives with "chop money" for household expenses, while wives also contributed to the household income. Capacity building training (X4) accounted for 0.8% of the effect of participatory land administration on livelihood levels. Ikein (1990) noted that the economic interests of power structures often take precedence over community welfare and livelihoods, leaving coastal villages vulnerable to the influence of oil firms and government policies. Age (X2) contributed 0.5% to the effect of participatory land administration on livelihood levels. Panford (2014) and Darkwah (2013) emphasised the importance of government policies and legislation in creating enabling environments for local content development, particularly for youth employment prospects. Educational level (X3) accounted for 0.2% of the effect of participatory land administration on livelihood levels. Darkwah (2013) argued that educational discrimination in the extractive industries limits job opportunities for local communities, with menial jobs such as drivers, labourers, and security guards being the only options available due to perceived technical expertise barriers. To promote equitable and sustainable livelihoods, policymakers should prioritise gender-balanced land administration, provide capacity-building training programmes, and implement policies that address age and educational disparities, particularly in coastal communities affected by extractive industries, ensuring that local content development and job opportunities are inclusive and accessible to all, regardless of sex, age, or educational background.

Conclusion

The results of this study provide insights into better ways to operationalise participatory land administration to help positively impact peasant livelihoods among fisherfolk in the Western Region of Ghana. The study revealed that although beneficiaries of the LRP were mostly youthful males with high levels of education who have had their capacity built in either agriculture, value addition, service, and vocational/technical skills, participatory land administration in terms of people dimension, process dimension, and practice dimension was rated as low by the project beneficiaries to affirm their desire to be involved in decisions related to their welfare. Again, the level of peasant livelihood in terms of livelihood assets, resilience to vulnerability, and risk management strategies was rated as moderately high to show their acknowledgment of the project's contribution to their livelihoods. The paper contributes to land administration theory by confirming a significant relationship between livelihood and participatory land administration at 0.01 alpha level. Again, the paper addresses the limited literature regarding the land administration theory by establishing a positive and low significant relationship between livelihood and sex, age, institutional arrangement, and land information at 0.01 alpha level. The best predictors of livelihood from the components of participatory land administration were sex, age, educational level, capacity training, and land policy altogether contributing (97%). By these parametres, this paper introduces new components for assessing peasant livelihoods to test the hypothesis of a unique data set from Ghana toward mitigating the negative effect of land grabs by the application of participatory land administration. The study therefore advocates that participatory land transfers should integrate capacity building, gender-related, and customary-related issues to better support peasant livelihoods. Inclusivity should be promoted in participatory land administration, ensuring that both male and

female beneficiaries are involved in decision–making processes and have equal access to resources and opportunities.

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