

Perceptions of Male and Female in Collaborative Process at Weija Irrigation Scheme of Ghana

Henry Mensah and Bachar Ibrahim

Brandenburg University of Technology, Cottbus-Senftenberg, Germany

Email: Henry.Mensah@b-tu.de

Abstract—Gender studies in irrigation farming are limited in Ghana. The objective of this study is to find out the difference between male and female participation, focusing on the types of farm activities they participate, reasons why they participate and how they significantly differ in perceptions on “Formal meeting”. The study surveyed farmers’ perception with semi-structured questionnaire administered to 151 irrigation farmers and analysed by descriptive statistics and non-parametric statistical test. The study relied on literature, interviews and personal observation. The responses of males and females tend to differ due to societal roles and expectations. The males mostly participated in scheme maintenance whereas females participated in fund raising. Additionally, the majority of the farmers attended meetings to acquire information and knowledge whereas farmers’ opinion was given minimum attention. The findings of this study deepen our understanding on collaborative processes at WIS and informs decision makers to respond quickly to specific needs, preferences and interest of male and female farmers.

Index Terms—collaboration, irrigation, participation, perception

I. INTRODUCTION

A. Background

Currently, irrigated agriculture is an important topic and one of the most effective ways to increase food production and to reduce poverty. It is evident that irrigation has increasingly improved the economic development in the semi-arid and arid areas, particularly in Africa [1] and MENA regions [2] through improving rural development, increasing income, increasing new opportunities and food security. In an analysis of “An Integrative Framework for Collaborative Governance”, [3] defined collaboration as the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished. In Ghana, the management and development of the irrigation sector are overseen by the Ghana Irrigation Development Authority (GIDA). The national irrigation policy makes provision for institutional collaboration to

manage irrigation water productively and promote collective resource management. The Ministry of Food and Agriculture (MoFA) and GIDA have established an institutional framework for policy implementation. The institutional framework is to promote engagement among stakeholders in the development of irrigated agriculture. Over the years irrigation farmers through GIDA have taken initiatives to respond to the concept of stakeholders’ collaboration among institutions such as MoFA, Universities, NGOs, private sectors, International Agencies and Donors to increase funding, technical support and information for the purpose of irrigation development. A considerable amount of literature has confirmed that stakeholders’ collaboration in irrigation development and management is crucial [4], [5]. In this context, farmers’ engagement with relevant stakeholders and collective activities are often seen as key factors in enhancing farmers’ livelihood. The engagement process shows how stakeholders interact with each other through sharing individual interests, developing a shared purpose, using sincere face-to-face interaction, open and sincere communication and reaching interim procedural and substantive decisions [3].

B. Gender Role and Agriculture in Ghana

Gender issues have been utilised in many applications such as community and rural development, nature conservation, health, education, agriculture and among others towards achieving sustainable development goal. Gender and culture can influence participation in resource management [6], [7], for instance, in an analysis of irrigated urban farming, [8] found out that the responsibilities of man and woman in the households are defined by culture. In some cases, activities such as taking children to school, attending parent teachers’ meetings, and going to the hospital are being determined by couples [9]. Reference [7] also confirmed that the primary role of men is to provide basic necessities for his household whereas women are expected to perform household activities to support their men and children. There has been a general conception that women are always marginalised in terms of access to natural resources, extension services, marketing information, farm inputs, credit, thus preventing them from similar farming activities as men. Additionally, gender roles can also inhibit women's adaptive capacity to climate change [10] and affect their involvement in the decision- making

Manuscript received August 31, 2017; revised January 30, 2018.

process [11]. In contrast, studies have proved that gender roles are dynamic and respond to changing economic circumstances [12], [13]. In Ghana, men are involved in farming activities such as land clearing, tilling of the soil, transporting and marketing of large amounts of farm produce. The men are involved in the cultivation of more lucrative cash crops, for example, cocoa and vegetables whilst women are predominately engaged in subsistence farming because it involves less capital and labor as compared to cash crop production [14]. Gender concerns have propelled governmental, non-governmental and political organizations to integrate gender issues into national and international policies and programmes over the years. In view of this, MoFA has introduced policy frameworks to facilitate the objective of gender equality and women empowerment [15]. Besides gender differences in access to productive resources, one can also find gender differences in knowledge and preference [16]. In other studies women's lower access to resources can result in low participation in collective activities [17]. Ghana's irrigation policy depends on sustainable collaboration of stakeholders with competing interests and priorities. Thus, the policy implementation requires collaborative effort among stakeholders (MoFA, farmers' group, local government bodies, NGOs, international agencies, private sector, etc.). Nevertheless, the role of stakeholders is questioned by some actors and scholars [18]-[20]. In this paper, the focus of attention was on female and male perception on the nature of collaborative process and farmers' participation in collaborative activities. The innovative aspect of this research is to deepen the understanding of decision makers about the specific needs of male and female farmers during collaboration process and activities. Therefore, the objective of this study is to find out the difference between male and female participation focusing on the types of farm activities they participate in, reasons why they participate and how they significantly differ in perception on "Formal meeting".

II. METHOD

A. Study Area

The figure shows the Ga South (Weija) Municipality in the Greater Accra Region of Ghana and has Weija as the capital (Fig. 1). The Ga South (Weija) Municipal District Assembly was carved from the Ga West District Assembly in November 2007. Weija Municipality lies within longitude 5°48' North 5°29' North and latitude 0°8' West and 0°30' West. It lies in the South-Western part of Accra and it is boarded to the South-East by Accra Metropolitan, South-East by Ga Central, North-East by Akwapim, the East by Ga West, north by West Akim, the West by Awutu-Senya, the South-East by Awutu-Senya East, Gomoa to the South-West and the Gulf of Guinea to the South. Whereas most farmers are located at Tubakrom, Kokrobite, Bortianor and Kasoa, very few are located at Oshiyie and Weija in the Ga South (Weija) Municipality.

B. Scheme Description

Weija Irrigation Scheme (WIS) was constructed to assist farmers to increase agricultural productivity and improve farmers' income. The type of scheme is canal, pump and sprinklers and takes its water source from the Weija lake. The scheme has a potential area of 1500 ha out of which an area of 220 ha is irrigable. The average farm size for each farmer is about 0.8 hectares. The main crop production are vegetables such as okra, pepper, garden eggs, tomatoes, cabbage, lettuce and onions.

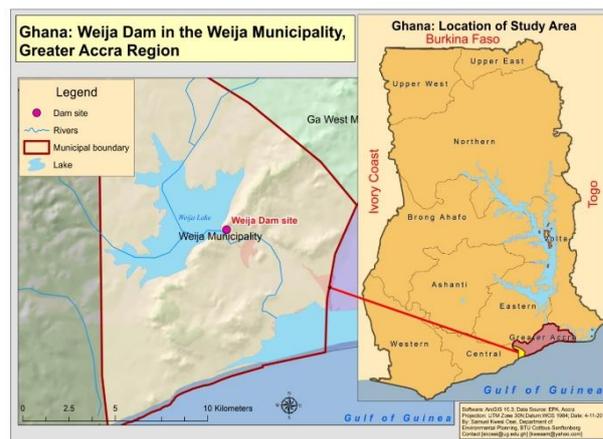


Figure 1. Ga south (Weija) municipality [21].

C. Data and Sampling Technique

A sample frame is generally a list, map or other specifications of the units which define a population to be sampled. From the total sample frame of 205 irrigation farmers that legitimately own lands at WIS, a sample size of 151 irrigation farmers were chosen. The sample was drawn using Krejcie and Morgan table to calculate minimum sample size of 134 [22], but in actual sense, a total of 151 farmers were included in the survey to forestall the effects of non-responses on the validity of the result. The study relied on sources such as literature, interviews and observation. The importance of multiple sources of data is a strategy to enhance the credibility of the data [23], [24]. Data was analysed using Statistical Package for Social Science (SPSS 22) version 22.0 and MS Excel (Microsoft office 2016). This work presents part of author's PhD research work at Brandenburgische Technische Universität Cottbus-Senftenberg, Germany.

D. Statistical Analysis

Based on the hypothesis established Mann-Whitney U-test was applied to deal with categories with only two groups within the sample population. Tests of significance are used to show whether there are differences between the two sets of independent samples or whether the differences could have occurred by chance. Mann-Whitney U-test has fewer assumptions which include, all samples should be randomly selected from their respective population, various samples should be mutually independent, measurement scale is at least ordinal or nominal and sample population distribution functions should be identical. The research employed the

use of construct (Formal meeting) along with Mann Whitney U test because of its importance in management studies. Since constructs cannot be measured directly as suggested by [25], the study selected variables to measure “Formal meeting” construct. The instrument used is a five-point Likert scale (from strongly disagree to strongly agree) and multiple response set. Since farmers are relatively homogenous such as common interests, beliefs, priorities, cultivating practices but still have individual needs, it was anticipated that the perception might not be the same. The level of significance ($p \leq 0.05$) was applied and Mann-Whitney U test was used. If the computed value is less than the level of significance, the null Hypothesis H_0 is accepted which indicates that there is significant difference between male and female

perception on the process of collaboration. Mann-Whitney U statistics is computed by following formula.

$$U = R1 - \frac{n(n+1)}{2}$$

U = Mann-Whitney statistics

N = Number of farmers

R1 = Sum of rank

III. RESULTS AND DISCUSSION

This section presents the results and discussion of the study. The findings are the compilation of survey conducted in 2016 (Table I). It illustrates some of the socio-economic characteristics of farmers such as gender, age, education, location of farmers, farm size, and managing of farms.

TABLE I. SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS

Variables	Group	Frequency	%
Gender	Male	118	78.1
	Female	33	21.9
	Total	151	100.0
Age	35 or younger	21	13.9
	36-45	40	26.5
	46-55	57	37.7
	56-65	16	10.6
	66 or above	17	11.3
	Total	151	100.0
Education	No education	57	37.7
	Non-Formal	7	4.6
	Primary	30	19.9
	Junior High School	30	19.9
	Senior High School	18	11.9
	Tertiary	9	6.0
	Total	151	100.0
Location of farmers	Tuba	65	42.2
	Kokrobite	41	26.6
	Bortianor	30	19.5
	Kasoa	11	7.1
	Others	4	2.6
	Total	151	100.0
Farm size (Ha)	0.625	63	41.7
	1.25	88	58.3
	Total	151	100.0
Managing of farms (Years)	5 or less	23	15.2
	5-9	10	6.6
	10-14	20	13.2
	15-19	20	13.2
	20 or over	78	51.7
	Total	151	100.0

It can be seen in Table I that between gender groups, (78.1%) of 151 respondents were males and (21.9%) were female. It is evident that females were very few and males were more. The responses from the males can overshadow the responses from the female counterparts. Hence, more time was spent with the females to make up for the number deficit. In Ghana, female participation in agriculture sub-sectors such as farming, processing and distribution are generally high. However, the data confirms that female participation in irrigated agriculture is a challenge. This could be as a result of land ownership that is in favour of males. Males are more likely to inherit agriculture lands than females [17], [18]. Among the respondents that were interviewed, the majority of them

were in the age group of 46-55 years representing (37.7%) followed by 36-45 years representing (26.5%). The total respondents who fell under the age group of 56-65 years were (10.6%). Only (13.9%) of the respondents fell below 35 years and (11.3%) were older than 66 years. The difference in age of older farmers (≥ 46 years of age) is comparatively higher than the younger farmers (≤ 45 years of age) representing (40.5%) and (59.6%) respectively. Per their educational background, majority reported to have no education (37.7%), followed by non-formal education (4.6%) and tertiary education (6.0%). Those with primary and Junior High school education are represented by a percentage of (19.9%) whilst Senior High school represents (11.9%). It implies that very few

farmers (6%) had tertiary education. During the farmers' survey, more than half of the farmers spoke basic English, hence the challenge in speaking the local language (Asante-Twi) was avoided. The differentiated count according to why farmers participated in collaborative activities is analysed (Table II). The females were not interested in attending meetings to part take in decision making or discussions but they were interested in accessing information and knowledge. The majority of the females also indicated that the motivating factor for them participating in formal meetings was the type of

topics to be discussed. The males also shared similar reasons as the females with the exception of decision making, since males were mostly involved in decision making associated with on-farm activities at the expense of the females. In terms of the non-farm activities like food processing, marketing or trading of agriculture products, females become more active in decision making. On the contrary, [26] found out that that majority (85%) of the females had freedom in taking part in decision making in every aspect of the farming activities.

TABLE II. DIFFERENTIATED COUNT ACCORDING TO WHY FARMERS PARTICIPATE IN COLLABORATIVE ACTIVITIES

Gender	Information & knowledge	Interest	Decision making	Access fund	Other reasons
Male	110	106	83	66	9
Female	28	28	13	26	6
Total response count	138	134	96	92	15

The differentiated farmers' group responses according to their areas of collaboration were analysed (Table III). Males recorded a high percentage of (87.7%) on communal labour compared to females (27.2%) participating in organised social activities. On the contrary, female counterparts recorded a high percentage of (100%) on fund raising compared to (16.1%) on equipment sharing and participation in off-farm social activities organised for farmers. In general, majority (105) of the farmers collaborated in the area of communal labour, followed by fundraising (116), equipment sharing (81), capacity building activity (74) and (36) in off-farm social activities organised by farmers, especially "National Farmers' Day". This Day was launched by MoFA to honour farmers who provided food for the country, however, farmers' participation has been poor. Farmers were asked to identify various aspects of their work where collaboration was key and effective. They offered a variety of activities. At WIS, farmers jointly helped each other in times of need. During communal labour on the farm, they undertook activities such as desilting, weeding and spraying. It was noticed that farmers actively engaged in maintenance of the canal. It was noticed that farmers actively engaged in maintenance work, especially males. Maintenance work involved physical strength, therefore females were not allowed to participate. The perception was that such activities were for men only. However, females played the role of supplying fund to buy food and drinks for their male counterparts. Farmers above 56 years were also exempted from some aspects of the farm work that involved physical strength at WIS. According to the irrigation farmers, Farmers' Water Users Association (FWUA) put in great effort to produce majority of vegetables to feed the inhabitants of Greater Accra despite all the challenges involved. However, MoFA's interest was highly centered on cocoa production at the expense of vegetable farmers in Ghana. This revelation affected their participation in any social event organized by MoFA, especially the male farmers. Farmers shared equipment more often because

of lack of farm machineries. Farm machineries were expensive and farmers found it difficult to hire them, especially females who cultivated small areas of irrigation land. The farmers are mostly trained on new agricultural practices and methods, facilitated by Extension agents. These training included pesticide application, integrated pest management, harvesting and marketing. A recent training was conducted on 19th June 2016, themed "Gender and Marketing" which had few females in attendance. Nonetheless, such trainings were not frequently held as revealed in other research [27]. This result shows the need for more training and capacity building [28]. It was noticed that farmers tend to actively participate mostly in fundraising events. Fundraising in terms of payment of Irrigation Service Charge (ISC) is compulsory for every irrigation farmer at WIS. Farmers who failed to pay suffered the consequences of disconnection of their hydrant after several warnings. In this case, most of the females paid promptly as compared to males because none of the females wanted to be embarrassed by calling of names during meetings. Activities such as maintenance on irrigation canal, construction of tunnel and helping other farmers recorded high turn up of farmers. The communal labour on the farm was necessary because the irrigation facility was not in a good state and hence needed regular maintenance. The state of the WIS is not as good as before and this challenge cuts across most irrigation schemes in the country. Some of them are partially rehabilitated and others are yet to receive support. Government's limited funds are not enough for rehabilitation projects on irrigation schemes. In Ghana, agriculture is the main source of income and occupation for most people, and farmers are more concerned about agriculture and its problems. Due to this, most farmers if not all participate more in irrigation management programs or activities. Without farmer's physical support the facility will collapse. Meanwhile, Ghana agriculture has long been relegated to the background [20].

TABLE III. DIFFERENTIATED FARMERS' GROUP RESPONSES ACCORDING TO THEIR AREAS OF COLLABORATION

Gender	Scheme maintenance	Fundraising (ISC etc.)	Equipment sharing	Capacity building activities	Social participation
	N (%)	N (%)	N (%)	N (%)	N (%)
Male	100(87.7%)	85(74.6%)	76(66.7%)	65(57.0%)	31(27.2%)
Female	5(16.1%)	31(100.0%)	5(16.1%)	9(29.0%)	5(16.1%)
Total responses count	105	116	81	74	36

The statistical test analysis of responses on “formal meeting”, comparing males and females is analysed (Table IV). In the construct “Formal meetings”, MWU test result shows that there is significant difference with regards to the selected variables such as regularity ($Z = -2.115$, $p = 0.01$), Time suitability ($Z = -1.895$, $p = 0.05$) Good attendance ($Z = -2.093$, $p = 0.04$), among gender group since ($p \leq 0.05$), therefore, the null hypothesis could be accepted. Whereas, there is no significant difference with the variables namely, views consideration ($Z = -0.452$, $p = 0.65$), good representation ($Z = -0.404$, $p = 0.69$) and leaders organisational skills, ($Z = -5.616$, $p = 0.00$) since ($p \geq 0.05$) therefore, the null hypothesis could not be accepted. It was found out that FWUA has ruled that farmers be punished for refusal to attend meetings but these rules were not enforced and farmers attended meetings when the issues to be discussed was important

to them. The analysis showed that farmers, (16.6%) strongly disagreed, (54.3%) disagreed, (14.6%) neutral, (10.6%) agreed, (4%) strongly agreed that their views are usually given consideration. In terms of farmers needs such as irrigation rehabilitation, electricity readjustment and resources, the stakeholders mostly ignore them, especially the government. In the same line farmers, (0.7%) strongly disagreed, (1.3%) disagreed, (11.9%) neutral, (57.6%) agreed, (28.5%) strongly agreed that farmers especially females have poor representation in management positions. Gender representation is a problematic issue [20], for example, it was observed that the males occupy all the positions including top management positions whilst females occupied lower positions. “Woman leader” was the only leadership and management position for females.

TABLE IV. STATISTICAL ANALYSIS OF RESPONSES ON “FORMAL MEETING”, COMPARING MALES AND FEMALES

Variables	Gender	Mean rank	Sum of rank	MWU	Z	P
Non-regularity	Male	71.68	8458.5	1438	-2.488	0.01**
	Female	91.44	3017.5			
Views consideration	Male	76.78	9059.5	1856	-0.452	0.65
	Female	73.23	2416.5			
Time unsuitability	Male	72.76	8585.5	1565	-1.895	0.05*
	Female	87.59	2890.5			
Bad attendance	Male	71.96	8419.5	1517	-2.093	0.04*
	Female	88.05	2905.5			
Good representation	Male	75.33	8888.5	1868	-0.404	0.69
	Female	78.41	2587.5			
Leaders organisation skills	Male	82.81	9771.5	1144	-5.616	0.00**
	Female	51.65	1704.5			

Significant at $P \leq 0.05$ *, $P \leq 0.01$ **

Formal meetings are a prerequisite for effective irrigation management because information and knowledge are exchanged and communicated. This implies that information gap between farmers, policy-makers; researchers and development agents could be minimised [29]. In the study area, formal meetings were conducted to inform farmers of the Irrigation Service Charge (ISC) and related expenses, the state of the scheme (for example pump failure, future training and FWUA rules). Nevertheless, other meetings are organised to allow farmers to meet government officials, NGOs, and local authorities to interact and an opportunity for farmers to express their needs and preferences. The result

indicates that there were significant differences between male and female perception on regularity, time suitability and good attendance. This can be explained that the male tends to dominate in farming whilst the female counterparts focused on trading of farm produce. Retail marketing and petty trading are sectors that have long been dominated by women in Ghana and West Africa at large. The difference in male and female perception could be that females in the study area performed dual roles (on-farm and household) in their daily life, which meant that they generally spent more time at home and less time on farm than the males. The lack of female participation in decision making during meetings contributes to the

neglect of female views that could have shaped irrigation management. For example, majority (54.3%) of the farmers indicated that their views were not taken into consideration and majority of them were females. The problem of having no platform for all stakeholders to deliberate on irrigation issues needed to be addressed. Farmers organized meetings in a small group which is characterized by low participation. Generally, females participated less in formal meeting at WIS. This result is comparable to other studies, where females participate less in the groups compared to their male counterparts [30]. One possible explanation for women's lower participation could be that similar meetings had been conducted by GIDA and NGOs and had yielded low outcome. For example, during encroachment of irrigation lands, physical and town planning, the chief, opinion leaders, assemblymen, GIDA representatives including surveyors and scheme officers met to assess the boundaries of the irrigation land. However, encroachment has reduced but not animal invasion of irrigation land. This diversity in leadership is an asset but it is important to enforce the stakeholder agreements. In other studies, it was revealed that interaction between farmers, irrigation officials and other stakeholders through various types of meetings such as "walk-the-channel" meetings, monthly and periodic meetings brought together suitable ideas that strengthened farmers to manage their individual farms which will also result in collective achievement of irrigation goals, constant food production and increased income for farmers [29].

IV. CONCLUSION AND RECOMMENDATIONS

The findings of this study indicated that farmers' opinion was given minimum attention. Females were not interested in taking part in decision making. Farmers participated mostly in fund raising which is a very important aspect of irrigation management. Females are more likely to differ from their male counterparts, due to societal attributes attached to them. The problem of females' attendance during meetings could be facilitated by advertising meetings of particular interest to women, hold meetings at times and in locations convenient and accessible to them. Information and training materials should be tailored to women's needs, especially the illiterates. Again, male farmers should not participate only in the physical aspect of the irrigation management but also intellectual contribution. GIDA needs to be strengthened to organise continuous farm forum and workshops devoid of any form of bias. Positive involvement with relevant stakeholders during such meetings will enable farmers to express their needs. Findings from this study cannot be generalised because the information is scheme-specific. Further studies can be replicated to compare the findings and generate a broad understanding of the issue.

ACKNOWLEDGMENT

We are grateful to Paul + Maria Kremer-Stiftung for their financial support to carry out this study. We also

thank WIS farmers and authorities for their commitment and contribution during the survey. Lastly, we would like to express our sincere gratitude to the reviewers for their remarks and reading the paper.

REFERENCES

- [1] FAO, "Irrigation potential in Africa: A basin approach," FAO Land and Water Development Division, Rome, Italy, 1997.
- [2] C. Breisinger, *et al.*, "Food security and economic development in the Middle East and North Africa," *IFPRI Discussion Papers*, vol. 985, 2010.
- [3] K. Emerson, T. Nabatchi, and S. Balogh, "An integrative framework for collaborative governance," *Journal of Public Administration Research and Theory*, vol. 22, no. 1, pp. 1-29, 2012.
- [4] O. Amponsah, H. Vigre, T. W. Schou, E. S. Boateng, I. Braimah, and R. C. Abaidoo, "Assessing low quality water use policy framework: Case study from Ghana," *Resources, Conservation and Recycling*, vol. 97, pp. 1-15, Apr. 2015.
- [5] P. Drechsel, E. Obuobie, A. Adam-Bradford, and O. O. Cofie, "15. Governmental and regulatory aspects of irrigated urban vegetable farming in Ghana and options for its institutionalization," *Irrigated Urban Vegetable Production in Ghana*, p. 199, 2014.
- [6] J. A. Singh, S. Gabriel, and D. Lewallen, "The impact of gender, age, and preoperative pain severity on pain after TKA," *Clinical Orthopaedics and Related Research*, vol. 466, no. 11, pp. 2717-2723, 2008.
- [7] I. Lambrecht, B. Vanlauwe, and M. Maertens, "Agricultural extension in Eastern Democratic Republic of Congo: Does gender matter?" *European Review of Agricultural Economics*, vol. 43, no. 5, pp. 841-874, 2016.
- [8] E. Obuobie, *et al.*, "Irrigated urban vegetable production in Ghana: Characteristics benefits and risks," 2006.
- [9] A. N. Kingiri, "A review of innovation systems framework as a tool for gendering agricultural innovations: Exploring gender learning and system empowerment," *The Journal of Agricultural Education and Extension*, vol. 19, no. 5, pp. 521-541, 2013.
- [10] B. Agarwal and A. Agrawal, "To farm or not to farm?" 2016.
- [11] A. S. Godara, U. Poonia, and U. Jyani, "Role of women in decision-making process in agriculture sector: A case study of district fatehabad," *Money*, vol. 3, p. 6, 2014.
- [12] C. R. Doss, "Designing agricultural technology for African women farmers: Lessons from 25 years of experience," *World Development*, vol. 29, no. 12, pp. 2075-2092, 2001.
- [13] I. Lambrecht, M. Schuster, S. Asare, and L. Pelleriaux, "Changing gender roles in agriculture?: Evidence from 20 years of data in Ghana," IFPRI discussion paper, 2017.
- [14] Y. Dejene, *et al.*, "Ghana country gender profile," *Human Development Department, African*, 2008.
- [15] MoFA, "Food and agriculture sector development policy (FASDEP II)," *Accra, Ghana*, 2007.
- [16] J. Wilbers, "Urban agriculture and gender: Some key issues," *Discussion paper IRUAF, ETC*, p. 15, 2003.
- [17] G. Varughese and E. Ostrom, "The contested role of heterogeneity in collective action: Some evidence from community forestry in Nepal," *World development*, vol. 29, no. 5, pp. 747-765, 2001.
- [18] D. M. Mendes, L. Paglietti, and D. Jackson, "Ghana: Irrigation market brief: FAO investment centre," FAO and IFC, Rome, Italy, 2014.
- [19] MoFA, "National irrigation policy, strategies and measures," Ghana Irrigation Development Authority (GIDA), Accra, Ghana, 2011.
- [20] R. E. Namara, *et al.*, "Irrigation development in Ghana: Past experiences, emerging opportunities, and future directions," *Ghana Strategy Support Program (GSSP) Working Paper*, no. 0026, 2011.
- [21] K. O. Osei, "The location of Weija municipality," Brandenburg Technology University, Cottbus-Seftenberg, 2015.
- [22] R. V. Krejcie and D. W. Morgan, "Determining sample size for research activities," *Educ Psychol Meas*, 1970.
- [23] Stake, *The Art of Case Research*, Newbury Park, CA: Sage Publications, 1995.

- [24] R. Yin, *Case Study Research: Design and Methods*, 2nd ed., Thousand Oaks, CA: Sage Publishing, 1994.
- [25] S. L. Ahire, D. Y. Golhar, and M. A. Waller, "Development and validation of TQM implementation constructs," *Decision Sciences*, vol. 27, no. 1, pp. 23-56, 1996.
- [26] E. N. Raidimi, "The roles and activities of women in the six selected agricultural projects in Thulamela Local Municipality of Vhembe District Municipality in the Limpopo Province," *South African Journal of Agricultural Extension*, vol. 42, no. 2, pp. 10-23, 2014.
- [27] V. Afari-Sefa, E. Asare-Bediako, L. Kenyon, and J. A. Micah, "Pesticide use practices and perceptions of vegetable farmers in the cocoa belts of the Ashanti and Western Regions of Ghana," *Advances in Crop Science and Technology*, pp. 1-10, 2015.
- [28] H. Mensah and B. Ibrahim, "Alternate solutions towards sustainable irrigated agriculture in Ghana: Review of literature," *Journal of Agriculture and Sustainability*, vol. 10, no. 1, 2017.
- [29] W. Brinkman and G. Wesseler, "Bridging information gaps between farmers, policy-makers, researchers and development agents," 2003.
- [30] A. Gyau, M. Mbugua, and J. Oduol, "Determinants of participation and intensity of participation in collective action: evidence from smallholder avocado farmers in Kenya," *Journal on Chain and Network Science*, vol. 16, no. 2, pp. 147-156, 2016.

Henry Mensah holds an MSc in Environmental and Resource Management from the Brandenburg University of Technology, Cottbus-Senftenberg, Germany. Now, he is studying Ph.D. program in Environmental and Resource Management from the Brandenburg University of Technology, Cottbus-Senftenberg, Germany. His major research interests are Agricultural and Rural Development, Sustainability, Monitoring and Evaluation, Collaborative Decision Making and Policy.

Prof. Dr. agr. Bachar Ibrahim is a Guest Professor at Brandenburg University of Technology, Cottbus-Senftenberg, Germany. He was the head of Department and a Professor at Damascus University, Faculty of Agriculture, Department of Rural Engineering, Syria.