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Original Article

Role of union digital centre (UDC) in agricultural extension services in Bangladesh

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A B S T R A C T

The purpose of the study was to reveal how effectively UDC working for the farmers who are contributing to the feeding of a huge population. Government planned for digital Bangladesh and established UDC in all *union* of Bangladesh providing digital support. This study stressed the UDC's contribution to the agricultural extension and expansion. The study found 86.3% of farmers and 100% of entrepreneurs strongly agreed that they (farmers) are benefited from the services of UDC. The study also revealed 44.2% and 51.6% of farmers satisfied with the services and information provided by the UDC respectively. But farmers (51.6%, agreed) and entrepreneurs (50%, strongly agreed) faced adversity in logistic support to provide digital services. Data were collected through a survey method using purposive sampling, a semi-structured questionnaire of 285 farmers from January to June 2019 in five districts of Bangladesh. The study recommended that government should increase technological and infrastructural support for tremendous output in agriculture.

Introduction

Bangladesh struggled with hunger, poverty, and other necessary things two decades ago. But from the beginning of the 21st century, she is growing so fast in a competitive world. Besides other initiatives, the development of ICT based sector helps to accelerate its economy and development of rural people. Present government initiates the biggest project for ICT development such as digital Bangladesh by 2021, launching Bangabandhu satellite, etc. Development in the ICT sector opens the window of reach at grass-roots level masses. The current government's Digital Bangladesh by 2021 vision proposes to mainstream ICTs as a pro-poor tool to eradicate poverty, establish good governance, ensure social equity through quality education, health care, and law enforcement for all, and prepare the people for climate change (a2i, 2011). With the support of technology rural people getting the latest services that useful for marginalized peoples. The economy of Bangladesh still agriculture-based, though the country improving in industrial and service sectors. About 65% of people in the country live in rural areas (WB, 2016). To meet the government of their needs established Union Information Service Center (UISC) in every union of the country in 2009. The UISC has been renamed UDC (Union Digital Center) in 2014 (Rahman, 2014). Through this project, the government became competent to provide necessary services available in the city, town, and big cities. The UDC providing all kinds of services necessary for peoples from old ages to young; farmers to the school-going child; job hunter to job provider etc. This is also a glaring example of how ICT can be leveraged to empower communities, especially the under-served communities, bring public services to the fingertips of people, remove social ills that clog the governance mechanisms while improving efficiency and cost-effectiveness of service production (a2i, 2011). This service provides farmers to learn about agricultural, fisheries, livestock-related information for better output and ways to solve the problems in the field of crops, and other agri-based activities (Muhammad *et al*., 2015). UDC providing information about precautionary measures to protects crops from insects, floods, etc. UDC playing a key role in information dissemination and service delivery point (a2i, 2011) for rural communities and peri-urban citizens. Another important objective of the initiative is to reduce costs and reach rural peoples easily. These centers run through the Public-Private Partnership process and equally two young, energetic entrepreneurs (including a female) getting the opportunity for income generation which is followed in every Union Parishads of the country. But there is serious lacuna regarding UDC. Lack of infrastructure, logistic

support, proper management, and awareness, this potential initiative getting fade (Salam and Marjan, 2015). To know the real facts, it is necessary to know the reasons and probable solutions from the original stakeholders of the services. The purpose of this study is to find out the role of the UDC's in the extension of agriculture in Bangladesh. To understand the things need to get an answer to a few questions like, how are the farmers getting services? What kinds of information are they getting? How are they benefited by the UDC's? The validity of the information at the execution level and barriers in the flow of information farmers face. This research attempted to find out the solution to the above questions and to know the structural strength of the UDCs to deliver services successfully with plans of action to reach the doorstep of rural farmers and reduces the digital divide (the gap between demographic and regions in terms of information and communications technology).

Statement of the Problem

Bangladesh is a small country with an outnumbered population. Therefore in this digital century, 63.37 percent of populations are living in rural areas according to the World Bank Meta-analysis. The service quality and standard enriched so fast in urban areas but not as much in rural areas. Now communication and connectivity developed all around the country but periphery areas are still lagging due to the proper implication of government initiatives and policies. While the government trying to provide all digital services in rural areas, in the meantime people of the rural areas are unable to take these facilities due to their less concern, education, and knowledge about all the facts of digital services. As a part of the initiatives, the government introduces UDC in all Union Parishad (small tier of local government) of Bangladesh with the highest digital facility to reach digital services at the grass-root level. Along with other facilities' providing agricultural information is one of the significant tasks of the UDC. Through which all required information about agriculture is available at the doorstep of the farmers. They can access any information easily, free of cost, less time required even using a mobile phone from UDC. In some cases, UDC arranged training programs for farmers regarding soil tests, fertilizer mixing inland, using pests for a better result than lead farmers getting better output compare to past. Even they received precise knowledge on how to produce a maximum crop with minimum cropland using organic fertilizer instead of using excessive chemical fertilizer. All the services are provided by UDC where two entrepreneurs are appointed to supply all the information using the internet and computer. To facilitate all the information government also developed a few websites where information with required images, the process of cultivation, irrigation management, tenure, harvesting time, preservation process, etc. are found on the website. Entrepreneurs have access to data, they received all problem statements from the farmers, they gone through the website and allowed solutions. In some cases, the field officer of the agriculture office provides advice where entrepreneurs got trapped. Local agriculture offices provide training facilities in some cases for entrepreneurs. But there is serious lacuna regarding this initiative. Farmers are not aware of this initiative, those hearing about it and reached to receive services they faced many problems like, take a long time because of slow internet, interrupted by the power supply, do not have all required machinery, entrepreneurs do not possess standard education and not expert in online activities, in some cases, they miss-behave with service receiver and so on.

Significance of the study

Once, the major contributor to the GDP of Bangladesh was the Agricultural sector. The contribution of the Agricultural sector decreases by 14.23 percent; employs 40.62 percent of the labor force (BER, 2018). The agricultural sector was replaced by the service sector in this century. Though land and farmer involvement decreasing production always in high due to the contribution of Information and Communication Technologies (ICT). ICTs denote devices like using the internet, mobile phone, television, radio, etc. as a media of communication. Through using these ICTs devices government trying to reach farmers to help them in accelerating production by providing information related to agriculture. UDC is a pioneering initiative of government to provide accurate, reliable, and quality information to Macro, Meso, and Micro levels (Hoque and Sorwar, 2015). Moreover, agriculture always plays an important role in the social and economic development of the country. A study conducted in Zambia found that farmers who used ICT obtained higher prices than farmers who did not use ICT for accessing market information (Ali *et al*., 2016). Which emphasis using ICT has a great impact on the total cycle (Bottom-up) of agricultural production.

Availability of the information helps them to use the small thing with better output. For example, increasing in population assured decreasing of agricultural land day by day, but food production still needful. This is the beauty of technology. In that case, UDC's playing a vital role in providing information and services to the rural people. This initiative opens a new avenue for rural people. It helps to reach the services to the doorstep of the rural people. It reduces cost and time too. There is a possibility to start e-commerce services for the farmers in terms of selling their goods through UDC's online services. At present, a joint rural e-commerce initiative of the Department of Women Affairs of the Ministry of Women and Children Affairs and BRAC called "Projukti haate Joyeeta'' is being implemented to enable local female artisans to sell their products online for a fairer price (Zaman and Rokonuzzaman). UDC's at a time will be a milestone not only within Bangladesh but also in the world in terms of innovation in information and service delivery (Alam, 2014). So, if this initiative can run properly with proper management and support, it will bring huge outcomes for the rural people and for sure national outcomes too.

Reflection of literature

Historically, Bangladesh is a land of agriculture and more than 80% of people living in rural areas just 3 decades ago. Due to technological up-gradation, everything has changed. Now only 65% of people are living in rural (WB, 2016) but the production of agriculture is steady and meeting demands for regular consumption- how? Because ICT-based logistic support helps to gear-up the farmer's capability to produce more with limited land. A study conducted by the Bangladesh Bureau of Statistics in 2017 revealed that the population of Bangladesh will be 218.1 million under a Laissez-Faire fertility assumption (LF scenario) and 201.3 million under an accelerated fertility transition (AFT) scenario by 2051 (BBS, 2018). To feed that a large number of the population increasing agricultural productivity is mandatory. The government of Bangladesh also projected

demand for major cereals by 2051 and the Bangladesh Bureau of Statistics estimated 44600 M. Tons food needed by 2051 whereas Bangladesh produced 35115 M. Tons in the year 2016-17 (BBS, 2017).

The uses of technology in rural areas increase the production of agriculture in developing countries. The economy of Bangladesh is booming and its agricultural land is decreasing due to the trend of industrialization. But its food production has increased at the rate of population growth. In this process, ICT took responsibility to keep production as per demand. Due to modern agricultural technology, the production of major food items has increased. In this case, information and communication technology has played a pivotal role in the development and decision-making of farmer's communities in developing nations. Farmers who used ICT obtained higher prices than farmers who did not use ICT for accessing market information (Ali *et al*., 2016). A study also revealed that the internet; mobile phones, radio, and television were the most important tools of communication providing knowledge and information to farmers about agriculture (Chhachher *et al*., 2014). In Bangladesh, UDCs doing this affirmative action by providing information at the grass-root level to farmers that reduce transaction costs but increases production, efficiency, and farmer's income. A study found that cost, time, and visits reduce immensely after introducing UDCs in rural areas (Zaman, 2015).

Table 1. Impact of UISCs on services delivery process[12]

Service	Before UISCs (or UDCs)			After UISCs (or UDCs)		
	Time	Cost (BDT)[a]	Number of Visits	Time	Cost (BDT)[a]	Number of Visits
Public						
Birth Registration	10 days	95-100	2	5 hours	60	1
Land Record	30-45 days	1045	5	15 days	80	2
Migration	9-10 months	150000-200000	Multiple (both local and national)	3-4 weeks	30000	1
Private						
Photography	2 days	98-105	2	2 hours	10	1
Money Transfer	7-10 days	100-120 per 1000	4-6	1 hour	10 per 1000	1

Source: PMO and Access to Information (A2I) program.
Note: [a] USD 1= BDT 78 (as on 13 January 2014).

Nowadays farmers are using not just UDCs information hub, but also using different websites for getting information about the proper way of farming (Joshi and Ayyangar, 2010). A study found that in Malaysia 94% of the Malaysian farmers used the internet to seek agricultural information while 85% of the farmers get information by using text messages (Hassan *et al*., 2010). The above kinds of literature are reflecting the success of UDC in Bangladesh for the wellbeing of rural farmers as well as the whole nation in terms of food safety for a large number of population. This research will be handy for decision-makers in this field to assure rural development and acceleration of future agriculture.

Approaches and Methodologies

Study area:

Table 2. Study area

SL No.	District	Upazila	Union Parishad	No. Respondents	
				Farmers	Entrepreneurs
01	Sylhet	Sylhet Sadar Upazila	Kandigaon	27	02
			Tuker Bazar	26	02
			Baroikandi	22	02
		Golapgonj Upazila	3 Fulbari Union	26	03
02	Noakhali	Begumgonj	Gupalpur	28	02
		Begumgonj	Hazipur	27	03
03	Mymensingh		Gangnimari	25	02
			Diagar Kanda	25	02
04	Dhaka	Savar	Pathalia	25	02
05	Narayongonj	Narangonj Sadar	Kashipur	29	02
		Araihazar	Fatehpur	25	02
		Total		285	24

Pre-test of the questionnaire: A pre-testing (pilot study) was conducted at 3 unions in Sylhet to validate the questionnaire. Ten respondents were interviewed where 7 were rural peoples, 3 were UDC's representatives, who were selected on a convenience basis. The purposes of the pre-testing were to check interview time, the difficulty level of the questions, questions wording i.e. if the questions were easily understandable or if there were any ambiguity, how the interviewees were responding to each question, etc. thus based on the pre-testing results we modified few questions accordingly.

Data Collection and analysis: Most of the data were collected from a primary source through on-site observation, face-to-face semi-structured, open-close-ended interviews of farmers and entrepreneurs. The population of the study has been selected from different Union Parishads of the country. In this research, the purposive sampling method was adopted qualitatively following the survey method. Qualitative methods were used to explain the significant phenomenon, social realities, and experiences. For the survey, a set of questionnaires (structured and semi-unstructured) was used to collect the required information. The number of Union Parishad has been selected from the 5 districts of Bangladesh and 11 Union Parishads purposively. The purposive sampling method has been used to select 285 respondents, 32 from each Union Parishad where 35 of the sample have been rejected due to incomplete information. The collected data has been accumulated, categorized, and analyzed keeping in mind the objectives of the study. Both qualitative and quantitative modes of analysis were considered in this research. Quantitative data from the research areas were analyzed through various graphical presentations like pie charts, tables, etc. Besides these, field-level data is presented and analyzed through tables and graphs. Statistical Program for the Social Science (SPSS) and MS- Office are used in this case. Qualitative data were observed and converted into a quantitative system because of needs.

Conceptual framework

The purpose of establishing UDCs in rural areas was to reach digital services to the grass-root level and make them easily

[1] Zaman, H. "Service Delivery Process innovation: Insight from Digital Bangladesh." Innovation and Development (Routledge), 2015: 5(1) 165-168.

[2] Table 1 modified by author without any changes

accessible to the marginal population. Many theoretical frameworks have been developed such as Capabilities (Sen) Framework, Livelihood Framework, Cultural-Institutional Framework, and Communication-for-Development (C4D) framework to study Information and Communication Technologies for Development (ICT4D) project (Hoque and Sorwar, 2015). The most relevant framework for this study is C4D for its purpose, access, and easiness in this research. The model was first innovated by UNICEF to study the communication process of children in rural areas and later it applied (Hoque and Sorwar, 2015) as "Communication-for-Development" (Bertrand, 2006) framework to study ICT4D project such as UDC.

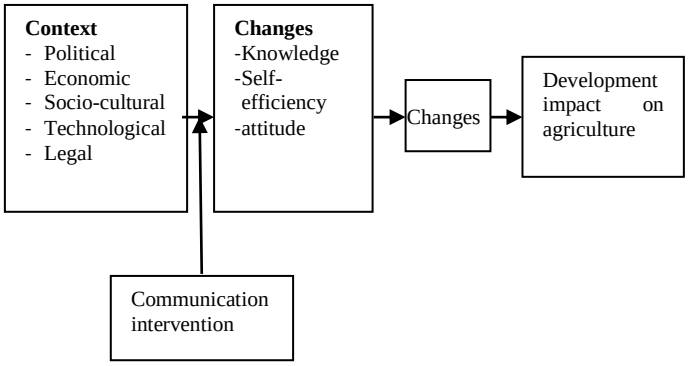


Chart -1. Communication-for-Development[3]

The figure indicating that if UDCs mediate on the above mention context than knowledge of agriculture, the efficiency of production will increase that led to the ultimate agricultural development. This method is used due to its easiness that connects ICT on the changes of individual behavior indirect production of agriculture. In this model, UDCs have direct intervention which plays a pivotal role in the impact of agricultural development optimistically. The researcher found that the political, economical, legal, and socio-cultural context of a country influences the knowledge and attitude of individuals which is moderated by different types of communication intervention (Jafari, 2013; Pearce, 2013; Porter, 2000). Finally, communication of information (Such as UDC) can play a tremendous role to change the agricultural economy by providing technological support, agricultural information.

Findings

UDC in rural Bangladesh brought massive changes in the service delivery mechanism. This study found diversified users and service providers in terms of demographic analysis where all participant's ages, education, income level, gender, etc. have a great impact on social change. All of the demographic factors have a multiplier effect in the service delivery process and mechanism.

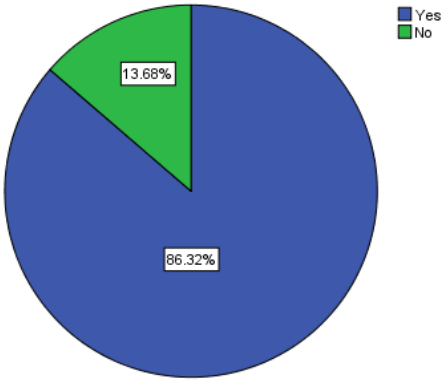
Information and services provided by UDC

UDCs provide necessary information on agriculture: Table 3, illustrated that in terms of information, UDC providing required information to the farmers where 51.6% of farmers agreed and 50% of entrepreneurs strongly agreed with this statement. This is a merely positive response from both sides but 50% of entrepreneurs also disagreed with this statement due to inadequate logistic support.

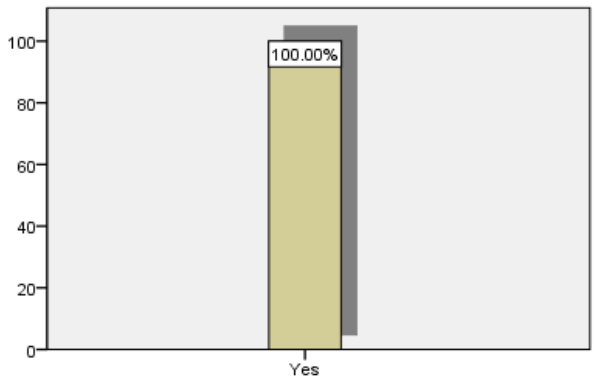
Table 3. UDCs provide necessary information regarding Agriculture

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	77	27.0	12	50.0
Agree (A)	147	51.6	0.0	0.0
Moderately Agree (MA)	40	14.0	0.0	0.0
Disagree (D)	18	6.3	12	50.0
Strongly Disagree (SD)	3	1.1	0.0	0.0
Total	285	100.0	24	100.0

Farmers are benefited through UDCs: Graph 1, shows that 86.3% of farmers and in graph 2, 100% of entrepreneurs are strongly agreed services provided by the UDC that benefited them in the cultivation process. These are the expected output of the programs of the government.



Graph 1. Farmers are being benefited over cultivation by dint of UDC (Farmers)

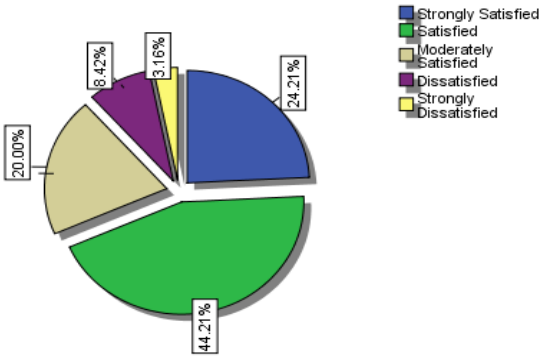


Graph 2. Farmers are being benefited over Cultivation by dint of UDC (Entrepreneurs)

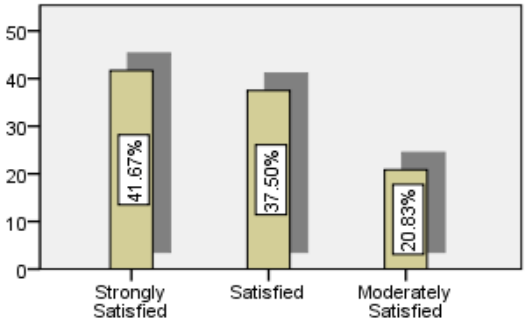
Farmers' satisfaction level about the service quality of UDCs: Graph 3, shows that most of the farmers are agreed (44.2%) with the services of UDC, and in graph 4, 41.7% of entrepreneurs are strongly agreed with the statement that services of UDC's are satisfying to enhance the agricultural activity. Though 20% of farmers and 20.8% of entrepreneurs from respective respondents have acknowledged the statement as moderately agreed. It seems UDC trying their

[3] Bertrand, J. O. "Systematic Review of the Effectiveness of Mass Communication Programs to Change HIV/AIDS Related Behaviors in Developing Countries." *Health Education Research*, 2006: 21, 4, 567-597.

best to satisfy its clients by providing services that boost up the production of agriculture.

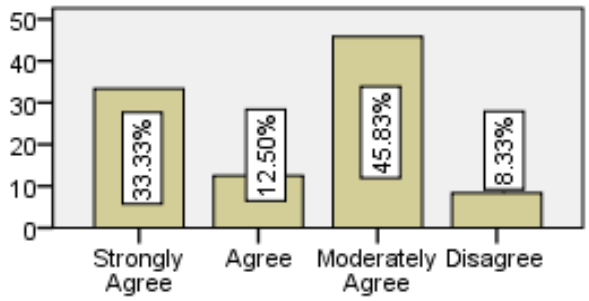


Graph 3. Satisfaction level of agricultural services of UDCs regarding its quality (Farmers)

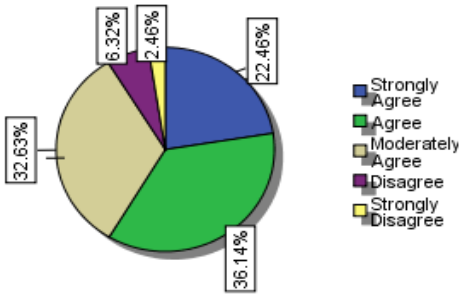


Graph 4. Satisfaction level of agricultural services of UDCs regarding its quality (Entrepreneurs)

Sufficient equipment of UDCs: Graph 5 and 6, represents that equipment that necessary to provide e-services to the farmers were not satisfactory level. Respondents from the farmers (32.6%) and entrepreneurs (45.8%) said about sufficient equipment as moderately agree which implies that it's a little bit disappointing. On the other hand, 36.1% of farmers and only 12.5% of entrepreneurs were agreed that they are getting and providing sufficient equipment facilities to digitalize agricultural activity to promote government digital Bangladesh vision and secure the country in the food sector.



Graph 6. UDCs have sufficient equipment to provide e-services for the farmers (Entrepreneurs)



Graph 5. UDCs have sufficient equipment to provide e-services for the farmers (Farmers)

The capacity of UDCs existing equipment: According to table 4, 33.3% of farmers and 37.5% of entrepreneurs moderately agreed that UDC had the required ability to provide e-services through the existing equipment. On the other hand, 14.4% of farmers and 29.2% of entrepreneurs are strongly agreed that UDC's are quite capable enough to assure services through the equipment they have.

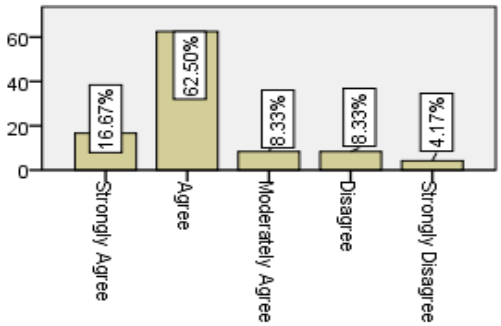
Table 4. UISCs have enough capability to provide e-services through existing equipment

Scale	Farmers		entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	41	14.4	7	29.2
Agree (A)	117	41.1	4	16.7
Moderately Agree (MA)	95	33.3	9	37.5
Disagree (D)	19	6.7	4	16.7
Strongly Disagree (SD)	13	4.6	0.0	0.0
	285	100.0	24	100.0

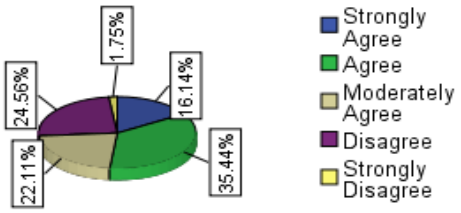
Seed production and preservation technology of rice: From table 5, it is clear that farmers (42.8%) and entrepreneurs (41.7%) were agreed with the statement that UDC providing technology regarding seed production and preservation of rice though 38.2% of farmers and 50% of entrepreneurs are strongly agreed with the testimonial of seed production and preservation technology. The result also implies that government initiative regarding making farmers aware and giving them the facility to getting satisfactory price has reached the remote areas through UDC.

Table 5. Seed production and preservation technology of Rice

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	109	38.2	12	50.0
Agree (A)	122	42.8	10	41.7
Moderately Agree (MA)	39	13.7	2	8.3
Disagree (D)	13	4.6	0.0	0.0
Strongly Disagree (SD)	2	.7	0.0	0.0
Total	285	100.0	24	100.0



Graph 8. Cultivation technology of Potato (Entrepreneurs)



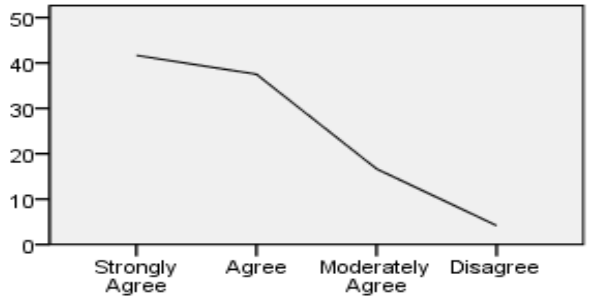
Graph 7. Cultivation technology of Potato (Farmers)

Cultivation technology of potato: Graph 7 and 8 indicates that UDC providing technological support for potato cultivation. In response to the statement, 35.4% of farmers and 62.5% of entrepreneurs are agreed. Another significant response came from the farmers (24.6) that explained as disagreed with the statement. It brings these two stakeholders into face-to-face situations.

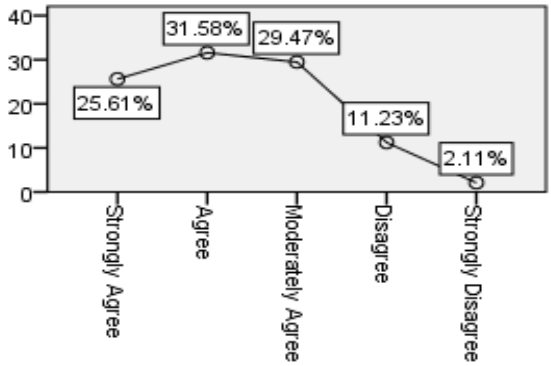
Seed production technology of wheat: Table 6 shows that 45.8% of entrepreneurs and 21.8% of farmers were agreed regarding seed production technology of wheat whether 30.9% of farmers and 29.2% of entrepreneurs moderately agreed with the statement in support of wheat production technology. On the other hand, 29.8% of farmers and 20.8% of entrepreneurs have completely disagreed with the expression of the fact.

Table 6. Seed production technology of Wheat

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	31	10.9	0.0	0.0
Agree (A)	62	21.8	11	45.8
Moderately Agree (MA)	88	30.9	7	29.2
Disagree (D)	85	29.8	5	20.8
Strongly Disagree (SD)	19	6.7	1	4.2
	285	100.0	24	100.0

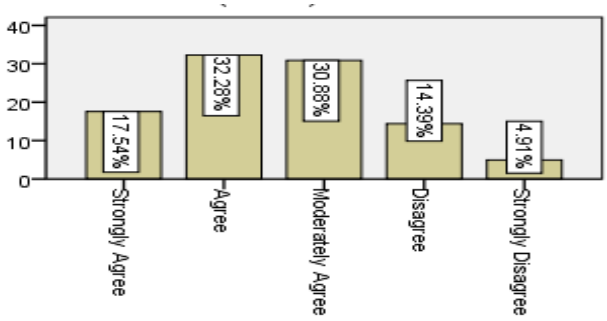


Graph 10. Seasonal Vegetable production technology (Entrepreneurs)

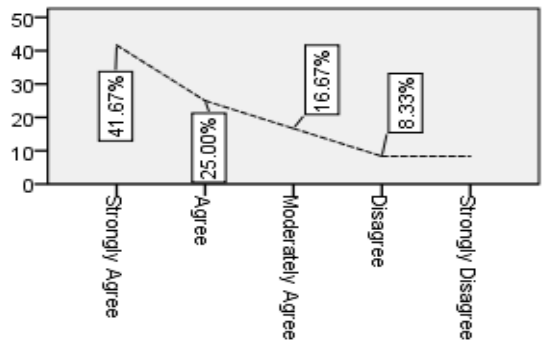


Graph 9. Seasonal Vegetable production technology (Farmers)

Seasonal vegetable production technology: Graph 9 and 10 depicts that in terms of seasonal vegetable production technology the highest response from farmers (29.5%) and entrepreneurs (37.5%) comment as agreed. Though regarding this issue 41.7% of entrepreneurs strongly agreed with this statement.



Graph 11. Soil test and instruct about the amount of Soil (Farmers)



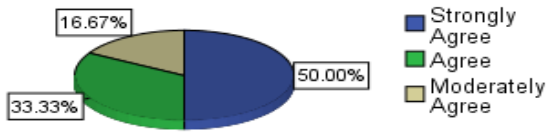
Graph 12. Soil test and instruct about the amount of Soil (Entrepreneurs)

Soil test and amount of soil: Graph 11 and 12 shows that 41.7% of entrepreneur and 17.5% of farmers are strongly agreed on the subject of soil test and instruction amount of soil given by the UDC for actual and perfect output of the production. On the other hand, 32.3% of farmers and 25% of entrepreneurs agreed positively about the above statement. But 30.9% of farmer's responses moderately agreed on the ground of soil test and amount of soil need for a proper result of the production.

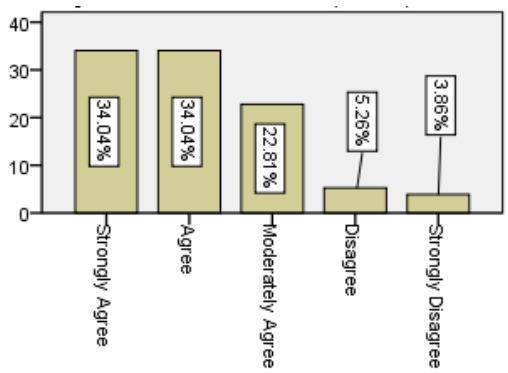
Fertilizer preparation: Table 7 indicates that in fertilizer preparation 30.5% of farmers got support and 50% of entrepreneurs given support to farmers which was strongly agreed by the respective respondents. On the other hand, 38.2% of farmers and 33.3% of entrepreneurs agreed on the subject. A minimal number of respondents from farmers disagreed (5.3%) & (4.2%) strongly disagreed on the above issue.

Table 7. Fertilizer Preparation

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	87	30.5	12	50.0
Agree (A)	109	38.2	8	33.3
Moderately Agree (MA)	62	21.8	4	16.7
Disagree (D)	15	5.3	0.0	0.0
Strongly Disagree (SD)	12	4.2	0.0	0.0
Total	285	100.0	24	100.0



Graph 14. Pest control methods (Entrepreneurs)



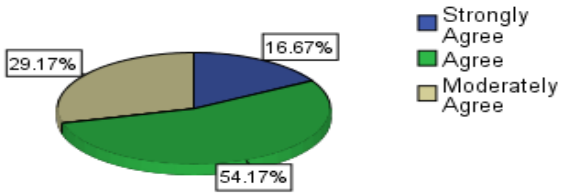
Graph 13. Pest control methods (Farmers)

Controlling pest: Graphs 13 and 14 depict that UDC playing a vital role in pest control in the cultivation of agricultural products. 34% of farmers and 50% of entrepreneurs strongly agreed on the subject of the pest control mechanism provided by the UDC. On the other hand, 34% of farmers and 33.3% of entrepreneurs agreed on the above-mentioned issue. It seems these services more popular and successful to the root level.

Flower production and garden management: Table 8 indicates that UDC does not provide much concentration on garden management and flower production. 40% of farmers and 37.5% of entrepreneurs expressed their opinion as moderately agreed, 38.2% of farmers disagreed on the subject, likewise, 29.2% of entrepreneurs agreed with the discussed matter.

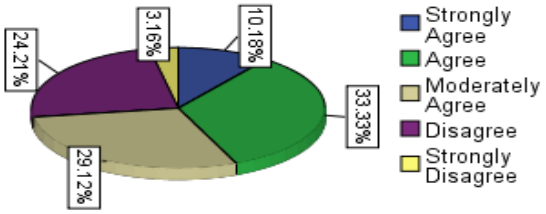
Table 8. Flowers Production and Garden Management

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	5	1.8	0.0	0.0
Agree (A)	37	13.0	7	29.2
Moderately Agree (MA)	115	40.4	9	37.5
Disagree (D)	109	38.2	4	16.7
Strongly Disagree (SD)	19	6.7	4	16.7
Total	285	100.0	24	100.0



Graph 16. Fish Cultivation information (Entrepreneurs)

Fish cultivation: Graph 15 and 16 shows that 33.3% farmer and 54.2% entrepreneur agreed with the subject. On the other hand, 29.1% of framers and 28.2% of entrepreneurs moderately agreed with a statement regarding the flow of information in fish cultivation. There is a severe concern in this reality that 24.2% of farmers disagreed with the statement.



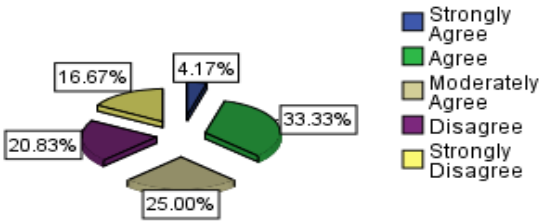
Graph 15. Fish Cultivation information (Farmers)

Seasonal fruit production and processing: Table 9 illustrated the subject of seasonal fruit cultivation and processing techniques where only 22.8% of farmers and 37.5% of entrepreneurs have agreed. On the other hand, 29.8% of farmers and 33.3% of entrepreneurs moderately agreed with the statement mentioned above. But the highest number of farmers disagreed (35.8%) on the matter of seasonal fruit cultivation and processing techniques.

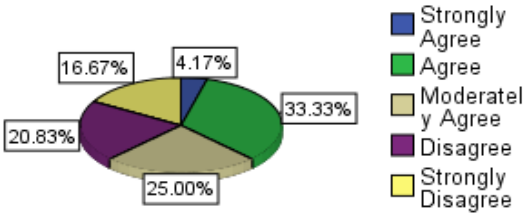
Table 9. Seasonal Fruits Cultivation and Processing techniques

Scale	Farmers		Entrepreneurs	
	Frequency	Percent	Frequency	Percent
Strongly Agree (SA)	11	3.9	2	8.3
Agree (A)	65	22.8	9	37.5
Moderately Agree (MA)	85	29.8	8	33.3
Disagree (D)	102	35.8	4	16.7
Strongly Disagree (SD)	22	7.7	1	4.2
Total	285	100.0	24	100.0

Tree plantation and environmental protection: In response to tree plantation, Graph 17 and 18 depicts that 40% of farmers and 20.8% of entrepreneurs disagreed on this issue, on the other hand, 36.5% of farmers moderately agreed and 33.3% of entrepreneurs agreed on the subject.



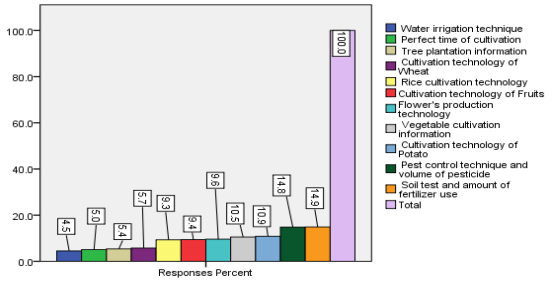
Graph 18. Tree Plantation for Environmental Protection (Entrepreneurs)



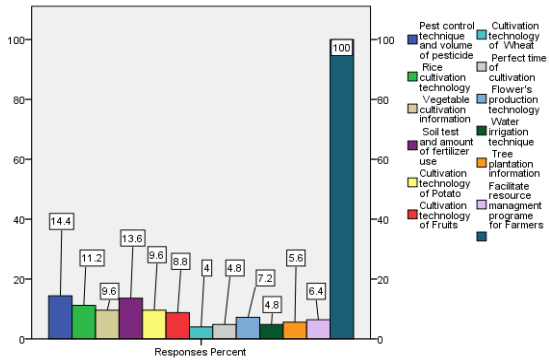
Graph 17. Tree Plantation for Environmental Protection (Farmers)

Potency and Paucity of UDC

Perception of farmers regarding services received from UDC: Graph 19 indicates that farmers received many services from the UDC. Along with other services, the most usual services they awarded from the UDC are like soil test and amount of fertilizer use (14.9%), pest control technique (14.8%), vegetable cultivation information (10.5%), etc. This graph proves that UDC always helping farmers in every step of their problem and even in diversified options.



Graph 19. Perception of farmers regarding services received from UDC



Graph 20. Opinion regarding services provided by UDC

The opinion of Entrepreneurs regarding services they provide: Graph 20 shows that pest control techniques (14.4%), soil test and fertilizer uses (13.6%), and rice cultivation technology (11.2%) are the most provided services segment of UDCs. Along with other services UDC responds to these segments and farmers seek most regarding this part of agriculture most.

Paucity of UDC

Table 10 shows that the lack of logistic support in UDC is a big problem in service providing. Most of the respondents from farmers (18.4%) and entrepreneurs (16.4%) adversely responded regarding this issue which is highest among other facts. Slow internet speed (12.2%, 12.9%), electricity problem (9.1%, 6.9%), lack of adequate entrepreneurs, infrastructure problem, ignorance of elected representatives, etc. are major problems identified by both stakeholders which are remarkably significant for the success of UDCs.

Table 10. Obstacles faced by Farmers and Entrepreneurs

	Criteria	**Frequency**	**Percent**
Obstacles faced by Farmer's	Electricity problem	26	9.1%
	Lack of logistic support	52	18.4%
	Slow internet speed and server problem	35	12.2%
	Lack of adequate and experienced entrepreneur	41	14.5%
	Absence of entrepreneur	22	7.7%
	Delay in services	27	9.4%
	Infrastructural problem	26	9.0%
	Ignorance of UP chairman	13	4.7%
	Unfriendly behavior	23	8.2%
	Lack of information	20	7.0%
	Total	**285**	**100%**

	Criteria	Frequency	Percent
Obstacles faced by entrepreneurs'	Electricity problem	2	6.9%
	Lack of logistic support	4	16.4%
	Slow internet speed and server problem	3	12.9%
	Lack of adequate entrepreneur	3	12.9%
	Lack of awareness of farmers about UDC/UISC	2	10.3%
	Farmers desire free seeds and medicine supply	2	7.8%
	Infrastructural problem	3	11.2%
	Ignorance of UP chairman	1	6.0%
	The behavioral problem of farmers	2	8.6%
	No fixed salary from the government	2	6.9%
	Total	**24**	**100.0%**

Discussions

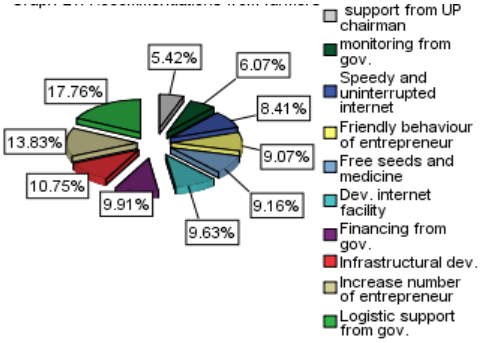
In developing countries like Bangladesh agriculture played an important role as the majority of the population lived in rural areas. This sector faces major challenges of increasing production to fulfill the demands of a huge population. The constitution of Bangladesh provides provision of assuring necessities of life, including food, cloth, shelter, education, and medicine (Chowdhury and Osmani, 2010). Regarding this issue government trying at the best level to make sure especially the food sector to accelerate production with minimum land and labor. As Bangladesh is a populous country government is quite concerned about this issue. In this mechanism, the government has established UDC in all UP to reach the doorsteps of farmers with sufficient equipment and information that helpful, cost-effective, and time-effective for the farmers. Literature saying that UDC consists of two entrepreneurs one male and one female who received required equipment, lands, tech connectivity, from the government to run UDC properly. They make a profit through the exchange of services of the masses.

The study established that most of the respondents are well known about UDCs and the services of the agriculture provided by the UDCs. All of the respondents gave a positive reply about the service quality and intensity of the services. Farmers also acknowledged that they are benefited by the services and pleased by the information of the UDCs provided. But the farmers show mixed reactions about the sufficiency of equipment of the UDCs and entrepreneurs too. Their reaction is found in the reflection of the services of the UDCs in some cases. The infrastructure, logistic support, internet services, and other technological support are fairly limited as on the demand. Both stakeholders equivalently reacted regarding these issues. They believe that if the government provides adequate equipment, it will be possible to provide facilities tenderly. The ultimate result will be rigorous and the government will achieve their vision successfully along with the proper support of the rural farmers.

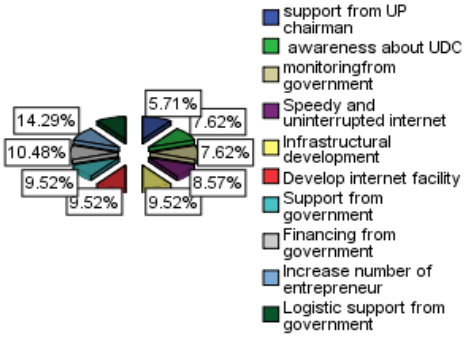
The study also reveals that farmers are happy about the role of UDCs in service delivery mechanisms in several multi-dimensional efforts to reach and help them with appropriate tools, methods, information, and training that more effective to them. UDC helps more effectively, boldly, and successfully in few areas like pest control mechanism, soil test, fertilizer preparation, amount of soil and fertilizer, rice production technology, potato production techniques, vegetable production, time and weather-related information, marketing procedure for best prices, systematic storing method and many other questions regarding farming of crops.

Besides, many successful and good efforts of UDC, it has faced many challenges to uphold and implement objectives of the government due to a few weak initiatives and lack of proper monitoring of authority. UDC has struggled with improper infrastructure, lack of logistic support, internet connection; slow internet, well-educated entrepreneurs, lack of accurate awareness among service receivers, lack of proper monitoring by the local government authority, the influence of Union chairman, etc. are responsible for not gaining expected outcomes. In this regard, entrepreneurs seek support from the authority and government to minimize these issues to attain their targets. But in any sense, both stakeholders believe and study also evident that the role of UDC in agricultural extension has quite outnumbered. The impact of UDC is increasing day-by-day and changing income, developing rural livelihood patterns, increasing production output, etc. due to proper policy of government and attachment of ICT in agriculture.

Future actions



Graph 21. Recommendation from farmers



Graph 22. Recommendations from Entrepreneurs

Unless taking proper action against weakness and insufficiency, this great initiative might be at risk for the government and service seekers. People of rural areas and farmers have faith in the initiative of the government for their betterment of social, economic, livelihood standards and a holistic purpose of fulfilling agricultural extension. Graphs 21 and 22 stated about close-ended answers received from the respondents of farmers and entrepreneurs. But their suggestions did not stay just above mentioned graphs.

Above graphs showing few factors that need to address properly for the development and extension of agriculture where most of the respondents recommended and ranked position got logistic support from the government said farmers and entrepreneurs side respectively. Respondents support more things except for the above-mentioned facts mentioned below:

- They also seek available online processes and procedures for marketing their crops through the help of UDC.
- Reduce hassle in getting information from different types of websites. It should be replaced with an integrated information hub for farmers where all websites related to agriculture will be integrated automatically.
- The government should teach a minimum level of ICT knowledge to the farmers and manage an absolute training facility for the entrepreneurs.
- Proper weather forecast and taking immediate actions against an emergency of environment.
- Awareness building among farmers about fraudulency events in online marketing and online transactions.
- Arrange stage programs to increase awareness among farmers about UDC.

Conclusions

This study found the input of UDC in providing services and information to the farmers from the beneficiary's point of view. In many approaches, UDC has a great impact on the increasing food production of Bangladesh that helps poor farmers to their economic and social development. UDC initiative with the help of ICT facility reduces time, cost, and hardship of farmers and playing a tremendous role in income generation and crop production. It has proven that if the government uses UDC properly and facilitate significantly, it will bring huge changes in rural areas. Giving proper guidance, reasonable prices of production, profitable market will motivate farmers to engage in a farming activity because at present they are not getting a proper value of hardship. As a result, farmers are gradually getting back from agricultural activity. But UDC has proved a new era in the agricultural extension of Bangladesh through their multi-dimensional activity. This study would be more fruitful if possible to show differences in income and production of farmers before and later introducing UDC.

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