The Role of Union Digital Centres in Reducing Social Inequalities in Bangladesh

Md. Minhajul Abedin[1], Muhammad Ferdaus[2], A.M.M. Mubassher Shah[3], Md Abu Sayem[4]

ABSTRACT

Union Digital Centres (UDC) have been inaugurated to accomplish the vision 'Digital Bangladesh' to empower rural people by providing digital services. The study attempts to assess the role of UDCs in reducing social inequality. It also tries to identify the barriers in providing digital services to the local disadvantaged people. For this purpose, the study exerted a cross-sectional mixed-method approach. Data were collected from 399 service receivers of UDC through a questionnaire survey, 16 KIIs and 5 FGDs. From principal component analyses, it is found that ensuring necessary information service (0.508) equal access for all and reducing time (0.681), cost and harassment of the people (0.778) play a significant role in reducing social inequality in rural areas. Logistic regression identified five factors that would reduce social inequality to a greater extent. The strongest factor is the equal accessibility of both male and female in receiving services and being entrepreneurs (OR=242.06, 95% CI 8.399-6976.93). KIIs and FGDs identified some challenges, including lack of awareness, conflict of job responsibility with UP secretaries, and weak network connection are the major barriers in providing effective services for UDCs. Still, UDCs bring a new dimension to the public service delivery system that empowers the people and reduces social inequalities in Bangladesh's rural areas.

Keywords: Union Parishad, UDC, Digital service delivery, Inequality, Barriers.

INTRODUCTION

Bangladesh is a developing country in South Asia with a huge population of 163 million

---

[1] Department of Public Administration, University of Dhaka
[2] Lecturer and Coordinator, Postgraduate Programs in Disaster Management (PPDM), BRAC University, Dhaka, Email: mferdaus@bracu.ac.bd
[3] Department of Public Administration, University of Dhaka
[4] Department of Public Administration, University of Dhaka

(World Bank, 2019). Development is the key concern of the country where social inequality is regarded as the main barrier. From diverse dimensions, including economic, educational, gender, power, access to social facilities, social inequality emerges in Bangladesh (Islam et al., 2020). The unequal distribution of national resources is the main issue of increasing social inequality. It has been reported that only 10% of the richest people in the country occupy 38% of the resources (BBS, 2016). The disparity between rural and urban is a concerning issue in the country. Though 65% of the populace belong to the rural areas, they become deprived of all social opportunities than the urban dwellers (Islam et al., 2020; World Bank, 2016). The monthly income of an urban household is 80% higher than a rural one. Even 37% of rural people are illiterate and do not have proper technological knowledge (BBS, 2016; World Bank, 2016). They also suffer from cultural lack, hindering their access to information on their rights and technological benefits. This excludes the rural people from the national development process and deprives them of their rights (Hoque &Sorwar, 2015). For this Bangladesh Government insisted on acquainting the rural mass to the central development and initiated some participatory avenues through the Local Government. This includes the Open Budget, Wardshava, and Village Court. (Chowdhury, 2017). Nevertheless, without the availability and effective usage of information, social inequality cannot be removed. In line with this purpose, 4,554 UDCs have been established in the country under the Digital Bangladesh Policy, one at each Union Parishad, the lowest tier of the local government, to connect the rural masses with modernization and technological development through delivering services at their doorsteps (A2I, 2018). These UDCs are run by the local entrepreneurs with the host of Union Parishad (UP) and linked to the Access to Information (A2I) program under the Local Government Division (LGD) and Prime Minister's Office (PMO) with the assistance of the United Nations Development Program (UNDP) (Faroqi 2015; Hasnayen& Sultana 2016). This project is based on a public-private partnership to provide 150+ public and private services by two entrepreneurs, including one male and one female. Until now, 9,094 entrepreneurs became self-employed through UDCs (A2I, 2018; Bakshi & Rahman 2016; Faroqi & Siddiquee 2017). In our country, about 200 million services are provided per year by UDC, which includes 3.2 million citizens, of whom 62,266 physically challenged people, 949,120 women, and 16,160 religious or ethnic minorities (BBS 2014). Union Digital Centre brings government, social and commercial services to the doorsteps of the rural people by reducing the time by 85%, cost 63%, and visit 40%. It aims to promote social equality by ensuring the participation of the poor, women, and marginalized people and reducing the digital divide (Dewan &Nazmin 2017; Faroqi 2015). However, a question arises whether the UDCs are contributing to fulfilling its inauguration aim of reducing social inequality and benefitting the rural masses with technological advancement. This

study is an attempt to contribute to exploration. It intends to assess the role of union digital centres in reducing social inequality and identifying barriers to providing digital services to the local underprivileged people.

LITERATURE REVIEW

This study discusses the Union Digital Centre (UDC) and considers the literature that demonstrates the electronic services toward reducing social inequality in the rural arena. The viewpoint of Information and Communication Technology for Development (ICT4D) considers ICTs a powerful tool to bring socio-economic development with tremendous potential support for the world's poorest populations (Gutterman et al. 2009). ICT also has been improving dramatically from previous decades in the term of easy and enhanced access to services, reduced time, costs, harassment and corruption in service deliveries (Bhatnagar 2009; Kumar & Best 2006). In the age of ICT, telecentre is a great innovation, similar to the UDC, which helps access the internet and services for remote and isolated communities (Char land and slums) toward leveraging economic growth and enhancing the quality of life (Proenza 2001; Hanna 2010). Besides, Li and Feeney (2014) stated that social inequalities would be significantly reduced when ensuring the e-services in the communities and people engage with them.

Ferdousi&Dehai conducted a study about general problems in the rural area of Bangladesh in (2014) and mentioned that approximately 63.37 per cent of people in Bangladesh live in a rural area, most of them face different problems such as corruption in land offices, irregularities in birth and date certificates, hassle for paying the electricity bill and other services' payments etc. due to being illiterate, lack of proper information and lagging in terms of utilizing computer and internet. Besides, they are also confronted with bitter reality in public offices, such as the absence of service providers, unusual delay, and intimidation if bribes are not paid and sometimes forced to pay extra costs and visits (Bhatnagar 2004). Sarker (2013), Faroqi and Siddiquee (2011) added that service users often reside in remote rural areas who need to travel to these locations to visit public officials for obtaining public information and services, such as copies of public documents, social benefits, or education, health and agriculture services, or to know market values and prices. To minimize these difficulties, the government of Bangladesh formed the Union Digital Centre in each Union Parishad for providing one-stop services.

Archmannand Iglesias (2010) mentioned that at present, we live in modern societies, also referred to as knowledge-based societies, which are highly dependent on information, providing the ability to comprehend those possibilities by overcoming conventional distance or physical space barriers. Some literature has found that innovation can help reduce the asymmetry of information and empower rural people in developing countries by getting this information. (Cecchini and Scott, 2003). People in developing countries generally depend on traditional approaches and sources that are easily available such as

travel to government office, word-of-mouth from other local people, relatives, NGOs and social voluntaries organization and religious or local organizers, and personal contacts to get national and local information (Roberts and Kernick, 2006; Ferris et al., 2008; Aker, 2008). Besides, Islam and Gronlund (2010) conducted a study on the Agriculture Market Information System (AMIS) in Bangladesh, and the result showed that it is possible to reduce social inequality through effective e-services based on people's information needs, incorporating easily accessible technologies and smart communication with the respective community.

Sarker performed a study on digital Bangladesh (2013) and showed that UDCs' services minimize cost, distance and time, eliminate intermediaries' problems, conflict and improve accessibility, accountability and transparency in the provision of information or services delivery. For example, he also stated that a peasant in a distant area could know about the appropriate use of fertilizers and pesticides and receive timely input from relevant experts in the public sector. Moreover, even a villager can apply for land records and registration, birth certificates and other services without repeated visits to offices today.

However, socio-economic development goals like reducing unemployment, poverty and inequality, creating new jobs and market work for poor people, health, agricultural and educational facilities promotion, and rapid and easy access to public services can be achieved by properly utilizing and developing electronic services (Rahman 2016). Many researchers found a significant relationship between reducing social inequalities and digital service delivery (Sarker 2013; Faroqi and Siddiquee 2011; Zaman 2015; Rahman 2016; Ullah 2017). However, the previous literature review has found that social inequalities can be reduced by adopting new technologies and e-services and little discussion on the particular innovation. Four indicators were taken from different studies to measure the quality of digital service, namely access to e-service, financial mobility, public accountability, and participation (Ullah 2017; Narayan 2005). If these four dimensions provide positive results, then we can say that UDC is providing quality service. Then a relationship will be drawn between the reduction of social inequality and service delivery of UDC.

DATA & METHODOLOGY

This study exerted a cross-sectional mixed approach that accumulated the advantage of qualitative and quantitative research methods. This method explored the role of Union Digital Centers (UDC) in reducing social inequality and identifying barriers in fulfilling this objective. For the study, the researchers collected necessary information with the help of primary and secondary data collection tools. Primary data were received by random sampling technique by using 16 KIIs among Union officials and UDC Entrepreneurs, 5 FGD from people of different occupations and 399 structured survey questionnaires from the service receiver of the UDC centres. Since the total number of services received

from UDC this year was unknown to researchers, Godden's formula was used to ordain the size of the sample.

$$n=\frac{Z^2 \times P(1-P)}{M^2} = 384.16 \approx 384$$

Here,

n = Sample Size for infinite population (more than 50,000)

Z = Z value (e.g., 1.96 for 95% confidence level)

P = Percentage of picking up a response (expressed as a decimal) (assumed to be 0.5 (50%) that ensures the maximum sample size).

M = Margin of Error at 5% (0.05)

Fifteen additional respondents were taken to reduce the likelihood of unresponsive error. Primary data were conducted from 10 September to 5 October 2020. The study survey and interviews included 3 UDCs through a convenient sampling method, presenting three administrative divisions. The survey questionnaire consists of 11 close-ended questions using a 5-point Likert scale to get the best response on UDC beneficiaries at the union level. Participants were asked about their demographic information, knowledge of the services received and response regarding accessibility, participation, accountability and economic mobility.

Secondary data was collected using inductive document analysis from various journals, newspapers, government and non-government reports, books, magazines, and documents focusing on the UDC in the Union Parishad of Bangladesh. For the analysis of this data, the researchers employed a thematic method that helps the researchers to define and follow the basic concept of the collected information.

A reliability test was performed to verify the internal accuracy of the questionnaire, and the Cronbach alpha score was 0.701, which met Nunnally's recommendation. Next, the sphericity test by Kaiser-Meyer-Olkin (KMO) and Bartlett was used and also found to be significant (0.774) for ten variables. Then the researchers used Principal Component Analysis (PCA) to reduce the variables' dimension and identify the most significant factors of UDC services to ensure people's satisfaction at UDC in Bangladesh. At last, the researchers used logistic regression analysis to explain the impact of different variables to reduce social inequality. The dependent variable was converted into a two-point scale where strongly disagree, disagree, andneutral points were considered "No", and others are considered "Yes" for conducting binary logistic regression. The Statistical Package for Social Science (SPSS) version 25 has been used for this paper to analyze collected survey data.

RESULTS

This study attempts to assess the role of union digital centres in reducing social inequality

and to identify barriers in fulfilling this aim. For this purpose, the data were collected from the citizens of Union Parishad, and principal component analysis and correlation analysis were conducted to analyze the data.

Table 1: Demographic characteristics of the respondents

Characteristics of the respondents		Frequency	Percent
Age category	18-25	87	21.8
	26-35	131	32.8
	36-45	76	19.0
	46-55	52	13.0
	56 to more	53	13.3
Sex	Male	277	69.4
	Female	122	30.6
Occupation	Farmer	75	18.8
	Housewife	90	22.6
	Service holders	58	14.5
	Students	43	10.8
	Businessmen	103	25.8
	Day labourer	30	7.5
Income range	0-10000	252	63.2
	10000-20000	88	22.1
	20000-30000	41	10.3
	30000-above	17	4.3
Know about UDC services	Yes	372	93.2
Visited UDC	0-2	306	76.7
	3-5	68	17.0
	5-above	23	5.8

The respondents' demographic characteristics show that most of the service receivers are male (69.4) with a monthly income of ten thousand or less (63.2%). It also shows that most people know about UDC's services (93.2%), but only 23.3% of people have visited UDC more than three times.

Table 2: Total variance explained by the obtained factors

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	2.911	27.720	27.720	1.742	17.421	17.421

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
2	1.185	11.282	39.002	1.689	16.892	34.313
3	1.125	10.715	49.717	1.362	13.622	47.935
4	1.089	10.372	60.089	1.126	11.260	59.195
5	.882	8.8398	68.488			
6	.785	7.474	75.962			
7	.723	6.886	82.847			
8	.666	6.340	89.187			
9	.590	5.620	94.807			
10	.545	5.193	100.00			

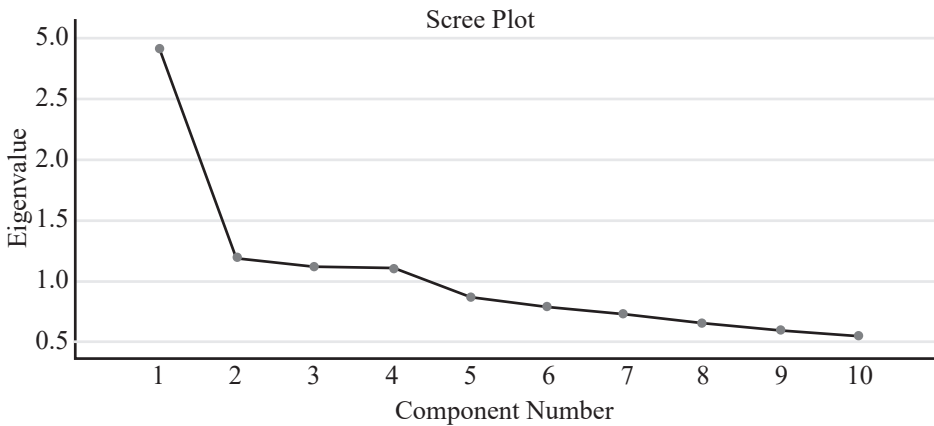Extraction Method: Principal Component Analysis.

Figure 1: Scree plot for dimension reduction

Table 3: Rotated component matrix for identifying the significant variables

	Mean	Component			
		1	2	3	4
Peoples' trust in UDC for receiving e-services	3.53	0.066	0.124	0.803	0.045
UDC ensures necessary information services to the people easily	3.53	0.508	0.187	0.161	0.069
Grass root people have easy accessibility in getting the desired e-service	3.18	-0.046	0.698	0.318	0.220

	Mean	Component			
		1	2	3	4
UDC ensures equal access to ICT facilities for all people	3.45	0.681	0.154	0.194	0.018
Male and female have equal access to be both service receivers and entrepreneurs in UDC	3.23	0.311	0.619	-0.323	-0.186
The service providers are friendly, helpful and accountable to the service receivers	3.42	0.361	0.023	0.655	-0.040
UDC service providers deliver services with competency and within time	3.17	0.047	0.589	0.113	0.419
The service delivery of UDC reduces distance, time, cost and harassment of general people	3.57	0.770	0.015	-0.008	0.201
The amount of fees paid for each service of UDC is under the ability of the grass root people	3.21	0.214	0.085	-0.012	0.903
The UDC empowers citizens to control their life by providing the required knowledge.	3.51	0.382	0.625	0.072	-0.049

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

The dimensions of the variables are diminished into four factors (Eigenvalue>1) by principal component analysis. Thus, 59.195% of the total observed variation can be explained by describing these four factors.

The rotated component matrix presents the variables under four factors after rotation. Ensuring necessary information service (0.508), equal access for all (0.681) and reducing time, cost and harassment of the people (0.770) are loaded in factor 1 with high factor loadings that indicate the accessibility of the citizens to the ICT service of UDC. Grassroots people getting desired services (0.698), equal opportunity for both male and female to become entrepreneurs (0.619), empowering citizens (0.625) are loaded in factor 2 with high factor loadings that indicates the participation of the citizens. People trust UDC (0.803), and the service providers being friendly, helpful and accountable (0.655) are loaded in factor 3 with high factor loadings that indicates accountability to the citizens. Fees paid for the service are within the ability of the citizens (0.903) is loaded in factor 4 with high factor loadings that indicate economic mobility of the people. Results show that the UDC effectively reduces social inequality by providing ICT services to the rural people as the mean of all the components is above the neutral value 3. However, some challenges are also identified that hampered the effectiveness of UDC in reducing social inequality.

One of the KIIs expressed,

"Lack of awareness among rural people is a major barrier for reducing social inequality through UDC service. It is a matter of hope that the state of awareness among rural people is gradually improving." (Personal communication, 30 September 2020)

A participant of the FGD also supported by others reveals that,

"Nepotism is seen in selecting the entrepreneurs of UDC, and sometimes the female entrepreneurs are ignored."(Personal communication, 2 October 2020)

One of the KIIs said,

"The people who live near the union Parishad office can get all the services of UDC easily. However, the people living in distance area go to the UDC only for an important task like getting a birth certificate, online porcha and online application purpose." (Personal communication, 30 September 2020)

Table 4: Logistic regression that assessed the effectiveness of UDC in reducing social inequality

	Sig	Exp (B), OR	95% C.I. for EXP(B)	
			Lower	Upper
Peoples' trust in UDC for receiving e-services (Ref= Strongly agree)	.000			
Strongly disagree	.004	.028	.002	.318
Disagree	.055	3.564	.975	13.028
Neutral	.149	2.189	.756	6.334
Agree	.003	4.217	1.614	11.018
UDC ensures necessary information services to the people easily (Ref= Strongly agree)	.011			
Strongly disagree	.579	2.337	.117	46.689
Disagree	.739	1.241	.348	4.431
Neutral	.021	.264	.085	.815
Agree	.119	.445	.161	1.233

	Sig	Exp (B), OR	95% C.I. for EXP(B)	
			Lower	Upper
Male and female have equal access to be both service receivers and entrepreneurs in UDC (Ref= Strongly agree)	.000			
Strongly disagree	.001	242.069	8.399	6976.931
Disagree	.901	1.070	.367	3.119
Neutral	.171	.496	.182	1.353
Agree	.053	2.683	.986	7.306
The service delivery of UDC reduces distance, time, cost and harassment of general people (Ref= Strongly agree)	.006			
Strongly disagree	.142	.201	.024	1.713
Disagree	.005	.242	.089	.657
Neutral	.975	1.017	.353	2.932
Agree	.046	.406	.168	.985
The UDC empowers citizens to control their life by providing the required knowledge. (Ref= Strongly agree)	.001			
Strongly disagree	.735	.637	.047	8.655
Disagree	.001	.172	.062	.478
Neutral	.752	1.167	.447	3.049
Agree	.672	.831	.354	1.953
Model fit: x2 =20.317, 8 degree of freedom				

Logistic regression was conducted to assess the impact of different components in reducing social inequality. This model can explain between 30.6% (Cox and Snell R square) and 40.8% (Nagelkerke R square) of the variance that correctly classified 74.9% of cases. Findings show that 5 out of 10 components significantly impact the dependent variable reducing social inequality ($P<0.05$). The result shows that shifting response from strongly disagree (OR=.028, 95% CI .002-.318) to strongly agree regarding peoples' trust in UDC would reduce social inequality. Similar results are perceived by shifting responsibility to the same scale for other variables too. Observing the OR, it is seen that the strongest predictor for reducing social inequality would be ensuring equal access for

both male and female in receiving service and being entrepreneurs (OR=242.06, 95% CI 8.399-6976.93).

DISCUSSION

Information and Technology serve as a powerful tool in improving the service delivery system in a developing country like Bangladesh. Over the last few decades, the development of the ICT sector has enabled innovations like UDC to reduce corruption, harassment, and inequality in society. In such a situation, the implementation of UDC at the union level is a landmark step of the Government of Bangladesh. The role of UDC has been widely praised at all levels for ensuring financial sustainability and public accountability by creating new entrepreneurs and eliminating social inequality. The study found that the service delivery of UDC reduced distance, time, cost and harassment of general people. Different previous studies also validate the above finding as Dewan (2017), and Faroqi (2015) mentioned that UDCs reduce 85%-time, 63% cost, and 40% visit of the rural people (Dewan 2017; Faroqi 2015). The study also explored that UDC enhanced citizen empowerment and grass-root people's accessibility to digital services in rural areas by providing necessary information to the mass people. The finding showed that UDC helped create social awareness and ensured the people's citizen right by providing public services. Before installing UDC, most villagers had to face various harassments to get birth certificates, pamphlets, online forms, and pay bills (Fersousi 2014). The villagers used to go to the district council and faced the bitter reality of government services. Previous studies show that the absence of service providers, unusual delays, intimidation, bribery, and various complications negatively affect the local level of public services (Sarkar 2013; Farooqi 2011). The study asserted that the poor are interested in various government services through the cash mobility of the financial service of the government. However, the use of e-service is a challenging issue for the marginalized group and villagers now.

This paper found that UDC increased public accessibility, which in turn improved citizen's trust in government services. At the same time, people from all walks of life, regardless of the rich and the poor, have an equal right to get e-services from UDC. Not only this, but UDC has also played a vital role in creating grassroots entrepreneurs in the villages. A previous study revealed that about 9000 entrepreneurs and 30000 local people took training to develop their career goals from the UDC centres (Baksi 2016). Besides, every UDC is managed under two entrepreneurs (one male and one female), eliminating gender inequality, which has greatly increased gender preference in UDC service at the union level. At the same time, the finding explored that the service providers are becoming more friendly, helpful and accountable to the service receivers by introducing the UDC.

The UDC's e-services at the local level have created a technological awareness among the rural people that have created a positive perception of digital services among the people. About 200 million services are provided per year, including 3.2 million people in Bangladesh (BBS 2014). This study presented that UDC has reduced

corruption, bribery, harassment, and inequality by ensuring the accountability of public officials and local government. In the past, only the dominant people of the village got services from the union level, and the poor fell into the hands of various brokers and were deprived of getting proper services. To look for the benefit of UDC, the study has got that UDC can reduce the information gap between rural and urban people. About 62,266 physically challenged people, 949,120 women and 16,160 ethnic minorities have received service from the UDC (BBS 2014). Nepotism in selecting entrepreneur at UDC is one of the main challenges of reducing social inequality. Results demonstrate that the dominant power structure of the villages will be broke by the effective implementation of UDC services. This positive wave of change will reduce social inequality from every corner of rural Bangladesh.

CONCLUSION

Union Digital Centre has prepared a new avenue for the rural people in Bangladesh. Effective digital service delivery can empower general people by providing necessary information on agriculture, education, land, health, law. UDC brought these services to the doorsteps of the citizens in a reduced time, cost and visit. Evidence suggested that citizen empowerment by reducing the information gap, grassroots people's easy accessibility, and quality service delivery with competency help reduce social inequality through effective UDC services. It focused on the people's trust in UDC services, friendly behaviour and accountability of the entrepreneurs, gender equality, and quality service at an affordable price to gain social equality through effective and efficient UDC services. On the other hand, lack of awareness among the rural people about digital services, nepotism in entrepreneur's selection, a continuous conflict between Union Parishad secretary and UDC entrepreneur, and infrastructural incapacity of UDC are identified as barriers to fulfilment this aim.

Despite revealing these results, this study has some limitations like every other research that created barriers to effective and neutral outcomes. The main drawback of this research is that the study could not be extended to all the UDCs of the country. In addition, this study was time-consuming and labour-intensive. On the contrary, data collection based on gender balance would provide a broad perception of this issue. Despite these limitations, this study brought a clearer picture of the role of Union Digital Centre in reducing social inequality.

This study suggested some policy implication to overcome the challenges in reducing social inequality at the local level. First, the Union Parishad should arrange an awareness campaign with the help of Upazila Parishad for the publicity of UDC services to the general people. When people know how easily they can avail of different government and personal services from one place at a minimal cost, they will be amazed. The popularity of the local government representatives will also rise because of this promotion. Second, electricity is a big problem in rural Bangladesh; the UDC centres should add an alternative source of electricity such as UPS or electricity generator for continuous service provision with the financial assistance of Union Parishad. This will

reduce the uncertainty of getting service and develop trust among general people. Third, study to measure service quality for which other significant models were compromised.

CONFLICT OF INTEREST

There has been no conflict of interest of the authors regarding the materials incorporated in this paper.

REFERENCES

A2I 2018, Union Digital Centers in Bangladesh – Present Status and Future Prospects, <https://a2i.gov.bd/publication/union-digital-centers> Accessed 17 February, 2021

Aker, JC 2008,'Does digital divide or provide? The impact of cell phones on grain markets in Niger',*Center For Global Development Working Paper*, (154).

Archmann, S & Iglesias, C 2010,'E-Government: A driving force for innovation and efficiency in public administration,'*EIPA Scope*, 2010(1), pp.29-36.

Bakshi, RK & Rahman, T 2016,'Expansion of selected services through Union Digital Centers,'*Copenhagen Consensus Center*.

Bangladesh Bureau of Statistics 2014, Census Report on Union Information and Service Centres (UISCs), <http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/7683435c_2ad1_4c2e_bcd5_00be5395163b/2020-09-22-12-47-29f2065b3ae2b812c5f80faee3aff313.pdf> Accessed 2 November 2020

Bangladesh Bureau of Statistics 2014, Publications of Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division, Ministry of Planning,<http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b734711b_5a89_4d8b_97de_949debfce292/BBS_Publication.pdf>Accessed 20 September, 2020

Bangladesh Bureau of Statistics 2016, Preliminary Report on Bangladesh Household Income and Expenditure Survey, Bangladesh Planning Commission, <https://www.academia.edu/37874731/Preliminary_Report_on_Household_Income_and_Expenditure_Survey_2016_BANGLADESH_BUREAU_OF_STATISTICS_BBS_STATISTICS_AND_INFORMATICS_DIVISION_SID>Accessed 17 February 2021

Bhatnagar, S 2004,'E-government: From vision to implementation-A practical guide with case studies,'*Sage*, vol. 21, no. 1.

Bhatnagar, S 2009,'A Framework and Methodology for Impact Assessment,' In: Bhatnagar, S (Eds.)*Unlocking E-Government Potential: Concepts, Cases and Practical Insights*, New Delhi: Sage Publications.

Cecchini, S & Scott, C 2003,'Can information and communications technology applications contribute to poverty reduction? Lessons from rural India,'*Information*

Technology for Development, vol. 10, no. 2, pp. 73-84.

Chowdhury, MS 2017,'Public forums for social accountability: a study of ward Shava and open budget system of 06 (Six) Union Parishads of Bangladesh,'*Asian Journal of Governance and Development*, vol. 2, no. 1, pp. 21-46.

Dewan, AM and Nazmin, SA 2017,*In-depth Monitoring of Access to Information (a2i) Programme of Bangladesh Government*, International Conference on Information Technology & Society.

Faroqi, MG& Siddiquee, NA 2011,'Limping into the information age: challenges of e-government in Bangladesh,'*The Journal of Comparative Asian Development*, vol. 10, no. 1, pp.33-61.

Faroqi, MG& Siddiquee, NA 2017,'Impacts of telecentre on users: the experience of the Union Digital Centre in Bangladesh,'*In Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance*, pp. 149-156.

Faroqi, MG 2015,'An assessment of e-government case study on Union Digital Centers (UDC) in Bangladesh,'*Australian Journal of Sustainable Business and Society*, vol. 1, no. 1, pp.84-96.

Ferdousi, S& Dehai, W 2014,'Economic growth, poverty and inequality trend in Bangladesh,'*Asian Journal of Social Sciences & Humanities*, vol. 3, no.1, pp.1-11.

Ferris, S, Engoru, P, & Kaganzi, E 2008,'Making market information services work better for the poor in Uganda,' *International Food Policy Research Institute (IFPRI)*.

Guterman, S, Davis, K, Schoenbaum, S& Shih, A 2009,'Using Medicare Payment Policy To Transform The Health System: A Framework For Improving Performance: Medicare could help slow its cost growth, improve the value obtained for the dollars it spends, and serve as a model for broader health system change,'*Health Affairs*, 28(Suppl2), pp.238-w250.

Hanna, NK 2010,'Transforming Government and Building the Information Society,'*Maryland, USA: Springer*.

Hasnayen, E& Sultana, S 2016,'Internet use in Bangladesh: problems and prospects,'*Int. J. Comput. Sci. Inf. Technol. Res*, vol. 4, no. 3, pp.251-260.

Hoque, MR& Sorwar, G 2015,'ICT Based e-Government Services for Rural Development: A Study of Union Information and Service Center (UISC) in Bangladesh,'*The Electronic Journal of Information Systems in Developing Countries*, vol. 71, no. 1, pp.1-19.

Islam, MS& Grönlund, A 2010, 'An agricultural market information service (AMIS) in Bangladesh: evaluating a mobile phone-based e-service in a rural context,'*Information Development*, vol. 26, no. 4, 289-302.

Islam, MR, Khan, NA, Fahrudin, A, Islam, MR& Islam, AM 2020,'Poverty and Social Inequality: Bangladesh Experience,' In *Building Sustainable Communities* (pp. 425-451). Palgrave Macmillan, Singapore.

Kumar, R & Best 2006,'Social Impact and Diffusion of Telecentre Use: A Study from the

Sustainable Access in Rural India Project,'*The Journal of Community Informatics*, vol. 2, no. 3.

Li, MH & Feeney, MK 2014,'Adoption of electronic technologies in local US governments: Distinguishing between e-services and communication technologies,'*The American Review of Public Administration,*vol. 44, no. 1, pp.75-91.

Narayan, D 2005,'Conceptual framework and methodological challenges,'*Measuring Empowerment.*

Proenza, FJ 2001,'Telecenter Sustainability- Myths and Opportunities,'*Journal of Development Communication,*vol. 12,no. 2, pp. 94-109

Rahman, SMA 2016,'Prospects of PPP in expanding ICT services in rural Bangladesh: A case of union digital center,'*International Journal of Economics and Finance*, vol. 8, no. 2, pp.163-70.

Roberts, M& Kernick, H 2006,'Feasibility study for SMS-enabled collection and delivery of rural market information,'*International Development Enterprises.*

Sarker, AK 2013. 'Digital Bangladesh: Swapna PuronerOvijatra (A Journey to fulfil Dreams),'*Tothyoseba Barta Songstha (TSB) Publisher*.

Ullah, MS 2017'Empowerment, Asymmetrical Power Relations and Impacts of Information Technology in Rural Bangladesh,' *South Asia Research*,vol. 37 no. 3, pp.315-334.

World Bank 2016, Poverty headcount ratio at national poverty lines (% of population) – Bangladesh, <https://data.worldbank.org/indicator/SI.POV.NAHC?locations=BD> Accessed 17 February 2021

World Bank 2019, Population Total- Bangladesh. <https://data.worldbank.org/indicator/ SP.POP.TOTL?locations=BD> Accessed 17 February 2021

Zaman, H 2015,'Service delivery process innovation: insights from Digital Bangladesh,'*Innovation and Development*, vol. 5, no. 1, pp.165-168.