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SPEARHEADING ICT4D KNOWLEDGE

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Bangladesh Institute of ICT in Development (BIID), being a distinctive ICT based initiative, intends to take the opportunity to host the paper. BIID is a private sector initiative to contribute to economic development of Bangladesh through integration of ICT in the provision of essential services primarily targeted to farmers, entrepreneurs and potential income generating groups in the rural areas. BIID's activities cover Research & Development, Knowledge and Skill development, Design Business Model for Telecenter (Rural Information Centre) to promote rural businesses specially the micro, small and medium enterprises. BIID is also working in Africa in the field of ICT4D. Strategically, being the sole specialized paper in ICT for development field, has the potential to serve a number of purposes.

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ICT4D Applications in Agriculture and Commerce

Welcome to the fifth issue of the Working Paper Series on ICT for Development!

For this issue, the editors have put together seven articles (the most number we had so far) that deal with ICT for Development in the fields of agriculture and commerce. If you can remember, the last issue was dedicated to e/m-agriculture. Since there was much enthusiasm regarding the theme, we decided to publish three more agriculture-oriented articles in the present issue. The first paper, written by Salam and Arman, entitled "Use of Information and Communication Technologies in the Fisheries Sector: A Study on the Fishermen from the Kutubdia Island of Bangladesh" documented the ICT tools fishermen in the island utilized. This included mobile phone, radio and radar while they are out at sea. On land, they used ICT and media channels such as computers, television sets, Internet, newspapers, sonar and GPS. These tools enable the farmers to know, search, distribute and share information and weather updates; track fish swarms, increase income, save time and assist shipping. A few fishermen did not use ICT due to lack of uninterrupted power supply, insufficient finance, lack of enabling government policies and lack of training on ICTs.

The second paper, written by Quarmal and Ozawa, entitled "Acceptance of ICT-Enabled Services among Bangladeshi Farmers" investigated the decision making process of farmers on whether or not to use ICT agricultural services. The authors used an Artificial Society Model, which consists of a set of agents that represents groups of people who respond similarly to a certain problem. The model simulates the dynamics of decision making processes in society. This helps in understanding various natural and social phenomena such as decision-making regarding the acceptance of ICT-enabled services among Bangladeshi farmers.

The third paper, written by Akbar and Nour, entitled "e-Krishok- A service brand to develop and promote ICT enabled solutions targeted to farmers and agro-businesses" detailed the e-Krishok service. e-Krishok is an agricultural extension service in Bangladesh designed to deliver information, advisory and market linkage facilities through ICT tools. It started as a campaign for ICT enabled information and advisory service; and transformed into a full range of services to include business planning and market linkage. Its underlying belief is that farmers learn best from each other and therefore, e-Krishok has formed a network of farmers.

The next four papers are on ICT for Development applications in the field of commerce. The fourth paper, written by Jang, entitled "Apple Communication via Twitter in Indonesia: Study of Tweets, Retweets, and Hour of Retweets" analyzed the Twitter accounts of Apple's distributors in the said country. Five theories were

used as the foundation of the paper: Computer Mediated Communication (CMC), Word of Mouth Marketing, Consumer Buying Decision, Social Media, and Twitter. After studying the contents of the Apple distributors in iBox, Infinite, EMAX, and eStore, the study discovered that conversations are the most tweeted ones. In case of retweets, the most dominant topic is Apple information. In case of hourly retweets received, the time of receiving the highest retweets varied from brand to brand. The conclusion of this research is that if brands aim to receive high retweets, then the current tweeted topics need to be adjusted.

The fifth paper, written by Sanga, entitled "Factors Influencing the Adoption and Use of ICT by Small and Medium Sized Enterprises in Tanzania: A Case Study of Kilosa District" assessed the socio-economic impact of low adoption of ICT among Small and Medium Enterprises (SMEs) in the Kilosa District. The study determined the following: ICT adoption rate in comparison with the general number of SMEs, challenges of ICT adoption in SMEs, awareness of the SME operators and owners on the importance of ICT adoption in their businesses and accessibility of ICT tools in areas of business operations among SMEs. The study identified some factors which caused the low adoption of ICT in SMEs in Kilosa District including knowledge needed in using ICT tools, low level of ICT base in SMEs sector, technical problems of some of ICT tools, high adoption costs and low emphasis of ICT usage (adoption) from both governmental and non-governmental institutions.

The sixth paper, written by Haque, entitled "Women Empowerment through Online Clothing Stores in Bangladesh: Prospects, Barriers and Challenges" narrated the experiences of female entrepreneurs relating to online stores and how these precipitated their empowerment. The Bangladeshi retail industry has witnessed major changes with the availability of Internet in Dhaka city. Since 2010, multiple online clothing stores emerged through the initiative of many housewives, working women and female students. The paper explored how women in Dhaka city used ICTs, especially social media to empower themselves through e-commerce. This paper concluded with a discussion of prospects, barriers and challenges of maintaining online clothing stores and strategies adopted by female entrepreneurs to attract consumers.

The final paper, written by Genilo, Akhter and Haque, entitled "Attracting and Keeping Bangladeshi Women in the ICT Profession" explained the need for more women in the country to participate in the sector in order to maintain its competitive edge in terms of a young, driven and relatively cheap workforce. However, this is easier said than done in light of the negative perceptions of Bangladeshi women against the ICT sector. By examining the cases of female students and professionals in the ICT sector, the paper sought to find out the factors that would attract local women to prepare for and join the profession. It also explored the circumstances that would enable Bangladeshi women to remain and prosper in the said sector.

From these articles, we hope for a better understanding of the ICT adoption and digital inclusion in the fields of agriculture and commerce. The articles looked not

only at specific fields but also at particular marginalized groups in society such as farmers, fishermen, small entrepreneurs and women. We hope that you enjoy this issue.

On behalf of the entire editorial board,

Jude William Genilo

Editor

Use of Information and Communication Technologies in the Fisheries Sector: A Study on the Fisherfolk from the Kutubdia Island of Bangladesh

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Abstract

The major developments in the field of Information and Communication Technology (ICT) have transformed the world more than any other technological invention. ICTs and fisherfolk cannot be seemingly related, but not anymore these days. Fisheries have been playing significant roles in the social and economic development of the country. On the other hand, ICTs can help fisherfolk a lot. The broad objective of the study is to assess the extent of use of ICTs by fisherfolk in the Kutubdia Island. In this study, researchers have used descriptive survey methods to collect primary information. Besides, data from secondary sources have also been used. To carry out this research, 60 respondents have been selected from Kutubdia Island of Bangladesh. The socioeconomic condition of these fisherfolk is not so good. However, all of the fisherfolk use mobile phone, radio and radar while they are out in the sea. They also use other ICT tools like computer, television, Internet, newspaper, sonar, wireless and GPS. They use these tools to know, search, distribute and share information and weather updates; track fish swarm, increase income, save time and assist shipping. A minor section of the fisherfolk do not use ICTs because they still depend on the traditional ways of catching fish. The study has found out that these fisherfolk face many problems in gaining access to ICTs which include lack of uninterrupted power supply, insufficient finance, lack of enabling government policies and lack of training on ICTs.

Keywords

Fisherfolk, fisheries industry, Information and Communication Technology

Introduction

The major developments in the field of Information and Communication Technology (ICT) have transformed the world more than any other technological invention since the 200 years of industrial revolution. The term Information and Communication Technology (ICT) include any communication device or system encompassing radio, television, mobile phones, computer, networking hardware and software, satellite communication systems, as well as the various types of applications associated with them. The innovations in electronics, speech processing, video, telecommunications, computing, software and wireless communication have brought on a flood of new experiences to humankind.

In Bangladesh, about 7.3 million people live in the coastal fishing villages, whose livelihoods depend on coastal and marine fishing (Ahmed, Islam and Shamsuddoha). Farroque and Nasiruddin's study shows (Rashid, 2011) that the fishing industry in general contributes 5.9 percent to the country's GDP and constitute 6-7% of the country's export income. Fisheries have been playing considerable roles not only in the social and economic development of the country but also in the regional ecological balance.

Information and Communication Technologies and fisherfolk cannot be seemingly related. But that concept has changed these days. The existence of ICT tools such as television, radio, newspaper, GPS, sonar, wireless set, computer, Internet, radar and mobile phone has indeed assisted fisherfolk a lot. The role of these tools in developing the socioeconomic condition of the fisherfolk cannot be denied. ICT tools have enabled them to save lives as well as cost, time and energy. Mobile phones and Internet for example provide opportunities for the fisherfolk to get the best price of their catch from the dealer even before they dock (Lal, 1999; Rao, 2004; Abraham, 2007; Barba-Sanchez, 2007; Abdul Razaq et al., 2009 and Bahaman et al., 2009).

Norizan (2009) said ICT tools could be a medium for e-entrepreneurship among fisherfolk which would encourage them to be involved in business activities, further boosting their socioeconomic status.

Omar, Hassan, Shaffril, Bolong and and D'Silva (2011) found that the emergence of new ICT tools such as GPS and sonar, and the existence of computer, Internet, wireless set and mobile phone have strengthened the ICT environment for the purpose of developing the fisherfolk's ICT skills and knowledge. Bangladesh Betar (radio) for example has introduced "Coastal Community Radio Unit," assigned to produce and broadcast bi-weekly participatory community programmes for coastal fisherfolk such as the inhabitants of the Kutubdia Island. The duration of each programme is twenty minutes and the format is radio magazine comprising of weather bulletins, market watch, interviews on different topics such as fishing,

health awareness, safe sea travel, fishing gears, disaster preparedness and so on. Group discussions, popular songs, motivational songs, talk shows and many other segments are used to make the programmes more attractive and communicative. A number of radio sets are distributed to the Village Resource Centers for the community-level listeners. Now, the fishing community has access to the largest and the most powerful medium in the country. Not just the radio, the other ICTs can also play vital roles in developing the socioeconomic condition of the fisherfolk of the Kutubdia upazila of Cox's Bazar district.

Study Location

The geographical position and climatic condition of Bangladesh have made its coastal areas one of the highly productive areas in the world (Islam, 2003). Kutubdia Island is one such. The Island is an upazila (sub-district) of the Cox's Bazar under Chittagong Division in Bangladesh. The upazila consists of an island in the Bay of Bengal, off the coast near Chakaria of Cox's Bazar. It has an area of about 36 square miles (93 km2), 18 miles (29 km) in length and 2 miles (3.2 km) in breadth. It is famous for the only lighthouse in Bangladesh which was built during the British rule. Kutubdia is known for producing shrimp and dried fish, locally known as "shutki." With a population of approximately 1,14,000 (male 51.66%, female 48.34%), the main occupations of the inhabitants of the island are agriculture and fishing. Approximately 60.79% people depend on agriculture and fishing for their livelihoods.

Review of Literature

A number of articles and researches on Information and Communication Technologies and the fisheries industries have been done in various countries. However, we hardly found any research in Bangladesh on this particular topic.

Singh and Bharati (December 12, 2012) in their study found that the latest innovation of ICTs in the fisheries sectors have brought about a tremendous change in the lifestyle of the fisherfolk. Different initiatives in ICTs have been taken up which would also help in expanding and developing the technologies used by the fisherfolk. He added that ICTs generate possibilities of solving the problems of rural people and can make them aware by providing scientific information. But the rural communities still lack basic communication infrastructure (Singh and Bharati, 2012).

New Information and Communication Technologies (ICTs) are being used across the fisheries sector, from resource assessment, capture or culture to processing and commercialization. Some are specialist applications such as sonar for locating fish. Others are for general purposes such as the Global Positioning Systems (GPS) used for navigation and finding locations; mobile phones for trading, information exchange and emergencies; radio programming with the fishing communities; and web-based information and networking resources. (FAO, 2007).

Aphunu and Atoma (2011) conducted a study on the "Extent of Use of ICTs by Fish Farmers" in the Isoko Agricultural Zone of Delta State in Nigeria. In this study, data were obtained from 60 respondents (purposively selected). The respondents were well aware of and used the telephone (GSM), television and radio for their contacts and enquiries, report preparation and information search. However, use of ICT facilities was constrained by the problem of maintenance, low level of production and rural poverty. Training to increase technical efficiency of farmers on ICT use and maintenance and establishing appropriate policies to reduce rural poverty remain instrumental towards ICTs use by fish farmers. (Aphunu and Atoma, 2011)

Omar, Hassan, Shaffril, Bolong and D'Silva (2011) conducted a study on "Information and communication technology for fisheries industry development in Malaysia." The study adopted the in-depth interview method. They found that GPS was the most preferred ICT among fisherfolk. The study also found that ICT offers many benefits such as improving the socioeconomic condition of fisherfolk, increasing fisherfolk's knowledge and skills on ICT, easing the communication process and enhancing the safety aspects of the fisherfolk when they are out at sea. (Omar, Hassan, Shaffril, Bolong and D'Silva, 2011)

Objectives of the Study

The broad objective of the study was to assess the extent of use of ICTs by fisherfolk in Kutubdia. Specifically, the study was designed to:

(i) Identify areas of ICTs used by fish farmers;
(ii) find out the advantages of using ICTs in the fisheries sector; and
(iii) ascertain the problems that fisherfolk face in gaining access to ICTs.

Method

In this study, the researchers used the descriptive survey method to collect primary information. Descriptive surveys discover the current situation in the particular area under the study. According to Wimmer and Dominick (2011), a large amount of data can be collected with relative ease from a variety of people through descriptive survey. They also said surveys allow researchers to examine many variables (demographic and lifestyle information, attitudes, motives, intentions, and so on) and use a variety of statistics to analyze the data (Wimmer and Dominick, 2011:185). Morever, data from secondary sources has also been used.

For this study, a sizeable sample has been selected through simple random sampling method where each unit in the population has an equal chance of being selected. To carry out this research, 60 respondents have been selected. The study was carried out in the Kutubdia Island. The island consists of six union parishads: Ali Akbar Dail, South Dhurung, Kuire Bil, Lemshi Khali, North Dhurung and Baragup. Ten respondents from each union have been selected randomly. A structured and semi-structured interview schedule have been used to collect

relevant information from the respondents. The dependent variable for this study was the "extent of ICT use" by fisherfolk. To determine the extent of ICT usage, 10 activity areas were identified and respondents were asked to indicate which of the activities they had used.

Results and Discussions

Socioeconomic characteristics of the fisherfolk

Some basic socioeconomic characteristics were generated by interviewing 60 fisherfolk of the Kutubdia Island. The information included income from fishing as well as other sources, educational status of the fisherfolk, fishing equipment and experiences, etc. The socioeconomic information collected for each of the categories are summarized in the following table (Table 1).

Table 1: Percentage distribution of respondents' demographic characteristics

Variables	Characteristics	% (n=60)	Variables	Characteristics	% (n=60)
Sex	Male	83.3	Age	Under 18	25.0
	Female	16.7		18-40	48.0
Family members	Below 3	17.0		40-62	22.0
	3-5	65.0		Above 62	5.0
	Above 5	18.0	Educational qualification	No formal Education	35.0
Marital Status	Single	33.3		Primary	36.0
	Married	66.7		Secondary	21.0
				Higher Studies	5.0
				Adult Education	3.0

Source: Field Survey (2013)

Table 1 shows that most (83.3%) of the respondents are male aged from 41-55 years. About 70% (48+22) fish farmers belong to the 18-62 age group. Most (66.7%) of the respondents are married – a trend which implies that most of them have family responsibilities that need financial commitment and support. 83% of the respondents have extended families and only 17% fish farmers have single families.

The educational backgrounds of the fisherfolk were not encouraging. Most of the fishers were illiterate or educated up to the primary level. About 35% of the respondents have no formal education, 36% primary education, 21% secondary education, 5% higher education, while only 3% have adult education. The level of education is insufficient for supporting adoption of technology.

Table 2 reveals that most (70.0%) of the respondents earn their monthly income mainly by fishing. This is same as a previous study, which reports that most of the fishers earn more than 90% of their income from fishing (Rahman et al., 2007). Apart from fishing, farming is the other major source of income of the respondents, accompanied by business, service and day labor. 21% of the respondents earn

their monthly income by farming, 3.7% by business, 4% by service and 2 % by selling labor.

The monthly income of the fisherfolk turned out to be quite good. Only 11% of the respondents earn below Tk10,000 per month. While 23.82% earn Tk10,000-20,000, 25% Tk20,000-30,000, 22.18% Tk30,000-40,000 and the remaining 18% of the respondents earn above Tk40,000 per month. As of January 2014, one taka is equivalent to USD 0.013.

Table 2: Income level of the fisherfolk of Kutubdia Island

Variable	TK.	% (n=60)	Variable	Income source	% (n=60)
Monthly income	Below 10,000	11.0	Source of income	Fishing	70.3
	10,000 –20,000	23.82		Farming	21.0
	20,000 – 30,000	25.0		Business	3.7
	30,000 –40,000	22.18		Service holder	4.0
	Above 40,000	18.0		Other	2.0

Source: Field Survey (2013)

In regard to their experiences, it was found that 70% of the respondents had less than five years of experience in fish farming whereas 18.3% had between 6 to 10 years (shown in Table-3). The implication is that the respondents are less experienced and have higher likelihood of risk in their occupation.

43% of the fisherfolk of the Kutubdia Island use fishing trawlers, 28% use nets, 23% fish-hooks and only 6% use other equipment.

Table 3: Fishing related information of the fisherfolk

Variable	Characteristics	% (n=60)	Variable	Characteristic	% (n=60)
Fishing equipments	Fishing trawler	43.0	Fish farming experience	Less than 5 years	70.0
	Fishing Net	28.0		6-10 years	18.3
	Fish-hook	23.0		Above 10 years	11.7
	Others	6.0			

Source: Field Survey (2013)

Use of ICTs by fisherfolk

The fisherfolk of Kutubdia Island use several ICT tools during fishing. The researchers asked them about ten ICT tools to know the frequency of use of each of those. These tools are mobile phone, radio, radar, television, computer, newspaper, Internet, sonar system, wireless set and GPS. The frequencies are presented below (table 4).

ICT tools such as television, radio, newspaper, GPS, sonar, wireless set, computer, Internet, fax machine and mobile phone have indeed helped fisherfolk to great extents. Their roles in improving the socioeconomic condition of the fisherfolk cannot be denied and there are a number of previous studies that have proven this. ICT tools are able to save cost, time and energy for fisherfolk and mobile phone

Table 4: Use of the ICTs by fisherfolk

uses of ICTs (n=60)	Never use (%)	Rarely use (%)	Sometimes use (%)	Always use (%)
Mobile Phone	0	1	3	96
Radio	0	3	13	84
Radar	0	6	28	66
Television	8	17	44	31
Computer	35	20	32	14
Newspaper/ Print Media	35	20	34	12
Internet	54	22	13	11
Sonar	58	22	11	9
Wireless set	55	25	13	7
GPS	60	25	13	2

Source: Field Survey (2013)

and Internet for example will provide opportunities for the fisherfolk to get the best price of their catch from the dealer even before they dock (Lal, 1999; Rao, 2004; Abraham, 2007; Barba-Sanchez, 2007; Abdul Razaq et al., 2009 and Bahaman et al., 2009).

The table shows that all fisherfolk use mobile phone. As of their responses, 96% always use mobile phones, 3% sometimes and only 1% rarely. Therefore, mobile phone is the ICT tool that the fisherfolk use the most. Radio comes next. Most (84%) of the respondents always listen to radio, while 13% listen to it sometimes and only 3% listen rarely. 100% of the respondents said they use radar when they are out at sea. Among them, 66% use it always, 23% sometimes and only 6% rarely.

The table further shows that most of the respondents watch television. Among them, 31% watch television always, 44% watch it sometimes and only 1% watch television rarely. About 65% of the respondents give their attention to newspapers. Among them, 12% always read newspapers, 34% sometimes and only 20% rarely. On the contrary, 35% of the respondents do not read newspapers at all.

The table also shows that most of the respondents never used Internet, sonar, wireless sets and the GPS. Among them, 54% never used Internet, 58% never used sonar, 55% never used wireless sets and 60% never used the GPS system.

Advantages of using ICTs as perceived by the Fisherfolk

It has been mentioned earlier that use of ICT tools saves cost, time and energy for the fisherfolk and mobile phones and Internet for example provide opportunities for getting the best price of the catch even before they dock. The following table gives us an understanding of the advantages of using ICTs as perceived by the fisherfolk of Kutubdia Island.

The table shows that the fisherfolk of the Kutubdia Island use mobile phone for various purposes. About 72% of the respondents use mobile phones to expand

Table 5: Advantages of using ICTs as perceived by fisherfolk of Kutubdia Island.

ICTs	Advantages	% (n=60)	ICTs	Advantages	% (n=60)
Mobile Phone	Expand marketing network	72	Print media	To know govt. announcement	12
	Facilitate communication	52		To know Fishing and fisheries information, news and views	34
	Saving time	32		To know weather updates	14
	Obtain information on the location of fish	49	Internet	Search, distribute and share information	26
Radio	To know govt. announcement	19		To know whether update	31
	To know fishing related information, news and views	95		To get a complete map of fishing area	38
	To know weather updates	46	Sonar	To know professional advices	34
Radar	To know weather updates	46		To know the movement of fish	22
	Obtain information about the condition at sea	56		Give information on location of the vessel	13
	Assist in shipping	64		Track the fish swarm	18
	Facilitate communication	46	Wireless set	Share information	20
TV	Know fishing related information, news and views	34		Obtain information on the location of fish	9.3
	To know govt. announcement	35		Enhances security aspects	13
	To know weather updates	46		Time saving	19
Computer	Store information	21	GPS	Obtain information on fishery	24.7
	Calculate	20		Improve safety while at sea	6
	To increase income	8		Increase income	11.3
	Time saving	17		To know weather updates	3

Source: Field Survey (2013)

their marketing networks. 52% use mobile phones to facilitate communication at sea. About half of the respondents use mobile phones for saving time. 32% of the respondents use them to obtain information on the location of fish swarms.

A study conducted in Malaysia found similar results. It showed that through mobile phones, fisherfolk can seek, disseminate and share fisheries-related information such as market price, online applications, weather conditions, professional advices, loan services, business opportunities, etc. Moreover, they can land on

better prices with the dealers even when they are still out at the sea (Omar et. al., 2011).

For knowing fishing and fisheries-related information and news and views that the respondents mentioned, radio is the main source of information. Most (95%) of the respondents have used radio to learn information. About 46% of the respondents use radio to know weather updates. Only 19% of the respondents use radio to know about government announcements.

Radar is another ICT tool that is used by the fisherfolk of Kutubdia Island. 64% of the respondents said that radars help them in shipping while they stay at sea. Most (56%) of the respondents obtain information about the condition of sea using radar. Fisherfolk of the Kutubdia Island (46%) also use radar to know weather updates and facilitate communication in sea.

The table shows that 46% of the respondents use television to know weather updates. The other usages of television are knowing government announcements and fishing and fisheries-related information and news and views.

The fisherfolk of Kutubdia Island use computer for recording purposes. 21% of the respondents use computer to store fisheries-related information. This is support in a previous study, which found that fisherfolk used computer to store information such as profit and loss figures, number of species caught, weather conditions, markets, etc (Omar et al., 2011). 20% of the respondent use computer to calculate. 8% of the respondents said by using computers, their income levels rose while 17% said it was a time-saving instrument.

The study found that fisherfolk of the Kutubdia Island are less concerned about reading newspapers. The main purpose of newspapers is to disseminate news and views to the public. But 40% of the respondents do not read newspapers. Only 34% of the respondents read newspapers to know fishing and fisheries-related information and news and views. 12% of the respondents read newspapers to know government announcements while 14% only for weather updates.

A study has shown that fisherfolk use Internet services to seek, disseminate and share fisheries-related information such as market price, online applications, weather conditions, professional advices, loan services, business opportunities, etc among colleague and related agencies (Omar et al., 2011). This study shows that 34% of the respondents use Internet to get professional advices while 31% use it to know whether updates. 26% of the respondents use Internet to search/distribute and share information.

Sonar is a very useful ICT tool in terms of detecting the location of fish swarms. Through sonar, fisherfolk can get complete and immediate updates of the available map of the whole fishing area (showing the exact location, extent, density, depth, movement, species and size of all fish shoals). In addition, information regarding depth, contours, slopes and stones can easily be gained through sonar (Omar et al., 2011). The table shows that 38% of the respondents use sonar to get a comprehensive map of the fishing area while 22% use it to know

the movement of fish swarms. 18% of the respondents use sonar to track swarms. Some 13% of the respondents use sonar to find information on the location of vessels.

Wireless set strengthens the security arrangement of the fisherfolk, especially when they are out at sea. If anything happens to them at sea, they can communicate with other vessels and the responsible agencies so that immediate action can be taken. On top of it, they can immediately share information regarding the fishing spots with others. Moreover, through wireless sets, they can deal a better price with the dealer even when they are still at sea. (Omar et al., 2011)

The table shows that, fisherfolk use wireless sets for various purposes. They (20%) use it to share emergency information. 19% of the respondents said that it was a time saving instrument while 13% said it enhanced their security. Some 9.3% of the respondents use it to obtain information on the locations of fish swarms in the sea.

A previous study showed that using GPS, fisherfolk can make pinpoint the locations of fish; it can help them in returning to the exact place even at night. It also provides information on geographical variables such as latitude, longitude, altitude, surface speed, sunrise and sunset times, odometer and accuracy warning system. (Omar et al., 2011)

But in our study, we found that only a small group of fisherfolk use GPS. They use GPS to obtain information about submerged reef. 6% of the respondents use GPS for security purposes. 11.3% of the respondents use GPS to increase income, while 3% use it to know weather updates.

Problems in gaining access to ICTs

The fisherfolk of Kutubdia Island face many problems in gaining access to ICTs.

44% of the respondents said they could not use television because there is no uninterrupted power supply. 37% of the respondents do not watch television because they cannot afford one.

A number of fisherfolk do not use computer as ICT tool. 32% of the respondents do not use it because computers are expensive. 31% of the respondents consider their businesses as relatively low scale of productions and hence there is no need of computers. A number of fisherfolk do not know how to operate computers. 19% of the respondents have problems in gaining access to computers because of an absence of enabling government policy.

Table 6: Problems in gaining access to ICTs

Tools	Problems in gaining access to ICTs	% (n=60)	Tools	Problems in gaining access to ICTs	% (n=60)
Television	Lack of regular power supply	44	Sonar	Lack of enabling govt. policy	31
	Insufficient financial resources	37		Low scale fishery production	13
	Lack of awareness	14		Lack of skills to operate	33
Computer	Lack of enabling govt. policy	19		High cost	20
	Low scale fishery production	31		Lack of training	19
	Lack of skills to operate	21	Wireless set	Lack of enabling govt. policy	17.7
	High cost	32		Low scale fishery production	22
Newspaper	Insufficient financial resources	47		Lack of skills to operate	33.3
	Did not read	28		High cost	41
	High cost	52	GPS	Lack of enabling govt. policy	22
	Lack of awareness	21		Problems of GPS maintenance	30.3
Internet	Lack of skills to operate	31		Low scale fishery production	23.4
	High cost	29		Lack of skills to operate GPS	27.7
	Lack of regular power supply	28		High cost of acquiring GPS	9
	Lack of training on Internet	19			

Source: Field Survey (2013)

The study shows that 35% of the respondents have no formal educational qualification (Table 1). 28% of the respondents do not read newspapers because they cannot read. Around half of the respondents do not have the ability to buy newspapers. 21% of the respondents do not read newspapers from a sheer lack of awareness.

31% of the respondents lack skills to operate Internet and 19% did not get any training on using Internet. There is no regular power supply in Kutubdia. A few use Solar panel as a source of power. 28% of the fisherfolk said they faced problems with regular power supply. 29% of the respondents do not use Internet as the cost of acquiring Internet facilities is high for them.

It was found that 31% of the respondents do not use sonar system. 19% of the respondents did not get any training on using sonar. 13% of the fisherfolk said they had relatively low scale production. 20% of the respondents do not use it because of its expensive. Similarly, 17.7% of the respondents do not use wireless sets. 22% of the fisherfolk said they had relatively low scale fisheries production and hence did not need wireless sets. 41% of the respondents do not use wireless sets because they

are expensive. Moreover, 33.3% of the respondents lack skills to operate wireless sets which may be a result of the absence of enabling government policies.

When the area of fishing activities is not too far away from the coastal areas, there is no need to use GPS. The study has found that 22% of the respondents do not use GPS. Only 23.4% of the fish farmers said they had relatively low scale production and therefore did not need GPS. On the other hand, 9% of the respondents said they did not use it because of high cost. Moreover, 30.3% of the respondents said they faced problems in maintaining the GPS.

Fisherfolk by and large have very poor understanding about the impacts that the ICTS can have on their productivity. On the other hand, the costs of installing ICTs are a big problem for these low-income fisherfolk. Besides, they still lack the skills required to operate the ICTs and depend heavily on the traditional ways of catching fishes. However, despite all the obstacles and problems they face in using ICTS, many respondents admitted the need and importance of ICTs.

Conclusion

ICT tools such as television, radio, newspaper, GPS, sonar, wireless set, computer, Internet and mobile phones have indeed helped the fisherfolk of Kutubdia Island a lot. Their roles in developing the socioeconomic conditions of the fisherfolk cannot be denied. ICT tools save cost, time and energy of the fisherfolk and mobile phones and Internet give the fisherfolk the opportunities to get the best price of their catch even before they dock.

Mobile phones, radio and radar are the most preferred ICT tools among the fisherfolk of Kutubdia Island. These tools help them in knowing fishing-related information and news and views; in shipping and communication; giving a hand to expand marketing networks, etc.

Television, computer, newspaper, Internet, sonar, wireless set and GPS are also popular among them. But there are a number of factors that have created hindrances for the fisherfolk. Negative attitude towards ICT, high cost (especially computer and sonar), dependence on traditional ways, no exposure to ICTs and their benefits are some of them. Besides, the negative attitude towards ICT usage emerged as one of the reasons why problem exists in using ICT among fisherfolk. A small section of the fisherfolk of Kutubdia Island do not use ICT as they still depend on the traditional ways of catching the fish. The respondents also claimed that they did not use the computer and the Internet because they did not feel the need to use these tools and also because these tools were expensive.

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Acceptance of ICT-Enabled Services Among Bangladeshi Farmers

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Abstract

This paper is aimed at presenting a proposed work that focuses on the decision-making process regarding the acceptance of ICT-enabled services among Bangladeshi farmers. For this purpose, an Artificial Society Model (ASM hereafter), introduced by the authors, is being used. This psychology-oriented ASM of decision-making deals with knowledge-based decision-making process. It consists of a set of agents that represents groups of people who respond similarly to a certain problem. The agents are characterized by the extent of knowledge that they have on the problem. The knowledge of an agent is expressed by a mathematical function. Thinking process of the agent is simulated by using a linkage model of cognitive psychology. A message is formed by the agent, based on the knowledge function and the conclusion (decision) of the agent on the given problem, which is also expressed mathematically, and is transferred to another agent and modifies the knowledge function of the agent that receives the message. As a result, the model simulates the dynamics of decision making processes in society. Such modeling helps us understand various natural and social phenomena such as the issue discussed in this article, i.e. decision-making process regarding the acceptance of ICT-enabled services among Bangladeshi farmers.

Keywords

ICT-enabled Services, Decision Making Process, Artificial Society Model

Acronyms

ASM: Artificial Society Model
ICT: Information and Communication Technology
CIC: Community Information Center
GPCIC: Grameenphone Community Information Center
SDC: Swiss Agency for Development and Cooperation
SRDI: Soil Resource Development Institute
CIDA: Canadian International Development Agency
EKN: Embassy of the Kingdom of the Netherlands

1. Introduction

We live in the age of information. Hardly any sector can be found where ICT does not have strong impacts. The agriculture sector is no exception. Farmers all over the world are using different types of ICT innovations for various purposes such as learning about new cultivation methods, crop diseases and their prevention/cure, etc. Observations from both developed and developing countries have proved that the use of ICT techniques can effectively improve the quality of farming. Recently, such ICT innovations have been introduced to the Bangladeshi farmers, too.

Whenever a new idea or innovation is introduced to the society, people do not accept or reject it straight away. A decision-making process (Reason, 1990; Wang and Wang, 2004; Wang and Ruhe, 2007) takes place in the society before the newly introduced idea or innovation is accepted or rejected. Various agents/stakeholders participate in the decision-making process and some of them often influence or regulate the whole process. The “diffusion of innovations” theory, introduced by Rogers (1962), can be referred to in this regard. However, the acceptance process of newly introduced ideas and/or innovations can be analyzed both at personal and collective levels. Venkatesh (2003) presented a comprehensive list of models that deals with personal acceptance of newly introduced innovations. As for the present issue, the authors intend to study the phenomena as a collective one. There are many ways to study and analyze collective/group decision-making process; using the artificial society model (Epstein and Axtell, 1996) is one. In order to study the present issue, i.e. decision-making process regarding the acceptance of ICT-enabled services among Bangladeshi farmers, one such ASM, introduced by the authors (Quarmal et. Al., 2011; Quarmal et. al., 2012) is being addressed.

2.1 The Model

The model being used for the present study is the Psychology-oriented Artificial Society Model of Social Decision Making. It was first introduced by the authors in 2011 at the 7th International Students’ Conference at Ibaraki University, Japan,

and the complete description of the model was presented in a later publication (Quarmal et. al., 2012). For the readers' convenience, the description of the model is being presented here again. However, before going into the details of the model, it would be better to make the concept of ASM clear.

An artificial society is a synthetic representation of a society (Epstein and Axtell, 1996). It consists of agents, which act in an environment by following given rules. According to the standard terminology, the artificial society is a particular case of the so-called agent-based models (Markov, 2007). Such models address "possible societies," their general processes, dynamics, and emergent properties (Gilbert and Conte, 1995). The aim of artificial society modeling is to model features and processes which characterize societies in general: cooperation, specialization, group formation, hierarchy, etc. An artificial society does not strive for superficial realism or direct correspondence with existing societies but for abstract logical relationships that characterize whole categories of phenomena (Hales, 1998). Such models provide a convenient modeling environment for analyzing the effects of different micro-foundations in human decision making (Flache and Hengselmann, 1998).

The present model, Psychology-oriented Artificial Society Model of Social Decision Making, presents mathematical formulation of the decision making process. On the course of mathematical formulation of decision making process, the first important thing to be noted is that when we think about an actual decision making process, we always have a problem that we are concerned about. The model is to be constructed in relation to the given problem. On the basis of the given problem, we classify people in the society into some groups. A group of people, who show the same character on the problem, is called "agent" (Russell and Norvig, 1995; Markov, 2007). They behave similarly to the problem. This is the definition of "agent" in our modeling. An artificial society regarding the problem consists of some such agents. The agents represent various organizations of a real society, i.e. general people, mass media, government, pressure groups, etc. Each agent has a certain knowledge regarding the given problem. Each agent makes a decision about the given problem based on the knowledge and differs with each other by their character in decision making. The agents make messages based on their knowledge and decisions regarding the problem, and exchange the messages through the channels between them. As in decision making, the agents have different characters in message making too. As a result of message exchange, the agents change their knowledge but they never change their character. The model is universal. It can be used to study the decision making process regarding any problem; only the agents might be changed if needed. The components of the model such as knowledge, decision, message etc. are expressed mathematically. Thus, the model enables mathematical formulation of decision making by which the process can be simulated.

2.2. Elements of the model

It has been mentioned already that when we think about an actual decision making process, we always have a problem to decide on, and the present model is to be constructed in relation to the given problem. Hence, the following is taken as the problem in order to explain the model properly:

Do we accept nuclear energy plants for producing electricity?

In order to observe the decision making process in a society regarding the abovementioned problem, i.e. do we accept nuclear energy plants for producing electricity?, people in the society can be classified into several groups, such as: Agent 1: general people (general citizens); Agent 2: scientist, i.e. specialists on nuclear energy problems; Agent 3: workers of nuclear energy plants; Agent 4: people from the government; and Agent 5: people from the mass media. Agent 1 does not have special or deep knowledge on the problem. They receive information about the problem mainly through the mass media. On the other hand, those who have professionally deeper knowledge on the problem are classified into Agent 2. The workers of nuclear energy plants are in a special situation in the society regarding the problem and are classified into Agent 3. They earn their living by the plant. Agent 4 has political influence in the decision making process. Agent 5 has important role in the decision making in society, because information on the problem is usually disseminated by the mass media.

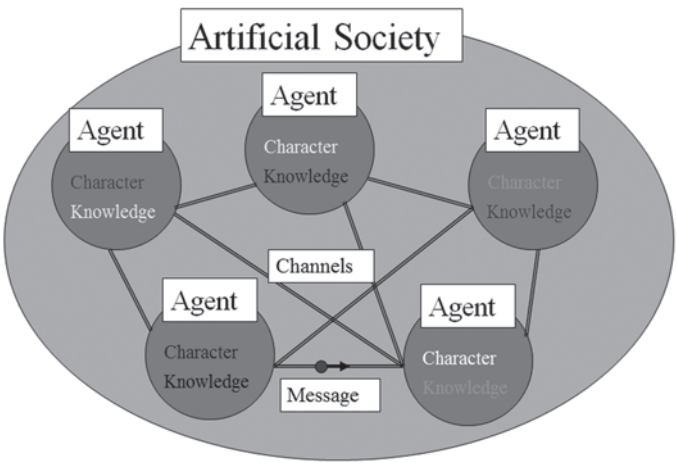

Figure 1: Psychology-oriented artificial Society Model

Figure 1 illustrates the model in general. An Artificial Society is made of various “agents.” The agents represent various groups of similar people in the society. Each agent has certain “knowledge” on a given “problem.” Each agent makes a “decision” regarding the given problem on the basis of the knowledge. The agents have “characters” different to each other in decision making. Agents make “messages” on the basis of their decision and their knowledge. Each agent has an

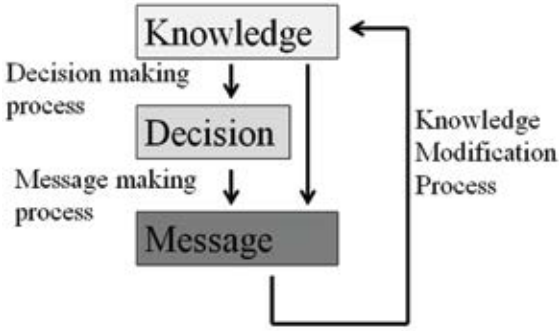

Figure 2: Social decision making processes

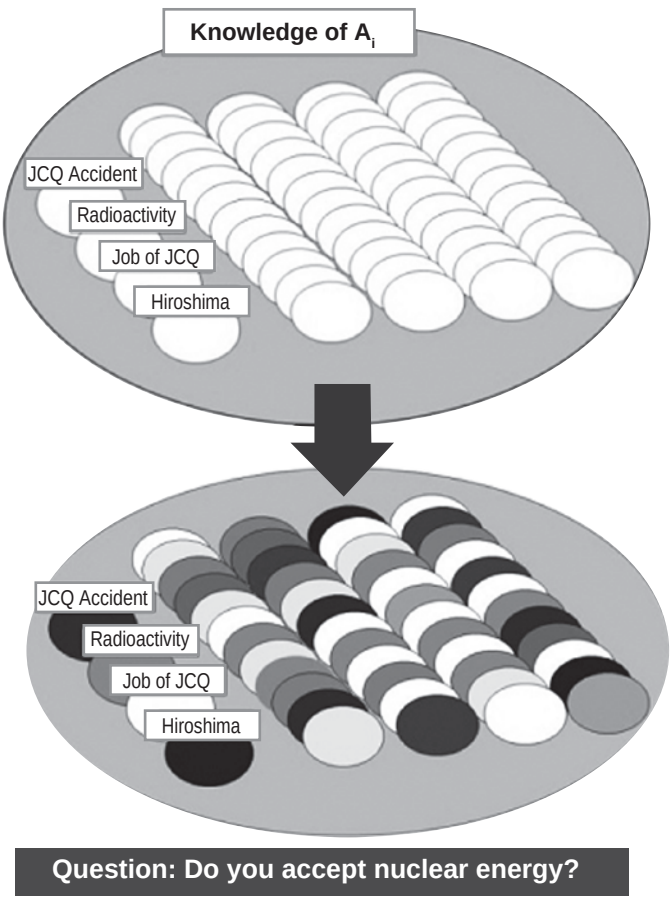

Figure 3: Ensemble of knowledge of an agent (top); Each 'knowledge' is labeled: (An Assumption) Knowledge leading to negative answer to the question is painted darker in color (bottom)

individual character in message making. Messages are transferred through definite "channels" between agents. Agents change their knowledge as a result of the message exchange. Here, agent, knowledge, character, decision, message and channel are the basic elements of the model.

Fig 1 illustrates that there are three important processes in social decision making. They are:

(1) Decision making process in an agent;
(2) Message making process by the agent; and
(3) Knowledge modification process of agents by the message.

A series of the elemental processes is essentially a nonlinear process. In the following section, we will try to express each of these processes in terms of mathematical tongue. How much the model is realistic depends on to what extent psychological factors are taken into account.

2.2.1 Knowledge Function

In our daily life, various kinds of information (signals) are continuously coming into our eyes, ears and minds. They are stored in our brain. It is known in cognitive psychology that there are two kinds of memory: temporal memory and eternal memory (Reason, 1990). Most of the information that comes into temporal memory are forgotten. Very few memories, which are strongly or intentionally impressed into our mind, are kept in our brain for a longer period. Every memory has a lifetime. The memory, which has effectively eternal lifetime, is called eternal memory. It is nothing but our knowledge itself. This is the background for the definition of knowledge function.

Figure 3 illustrates the ensemble of knowledge stored in the brain of an agent. Knowledge on JCO accident, radioactivity, job of JCO and Hiroshima are the example of the elements of the ensemble. As is noted before, the model has a given problem for decision making. In this case, it is the question: Do we accept nuclear energy plants? The element of the ensemble can be painted in color. The knowledge, which leads to negative answer to the question, is painted dark and the knowledge, which leads to positive answers, is shaded lighter.

For example, knowledge related to Hiroshima is shaded dark because the atomic bomb attack in Hiroshima leads to negative answers to the question. A simple statistical procedure shows that the existence of the knowledge function that represents a state of knowledge of the agent regarding the question. This is shown in Fig 4, where the shade is expressed by a parameter: $0 \leq x \leq 1$. The extreme case $x = 0$ is labeled black and the other extreme case $x = 1$ is white.

Here, the knowledge function $K_i(x)$ of agent A_i is assumed to be normalized, namely, $\int_0^1 K_i(x)dx = 1$. This is because the most important factor in decision making is not the absolute amount of knowledge but the distribution of knowledge against the parameter x.

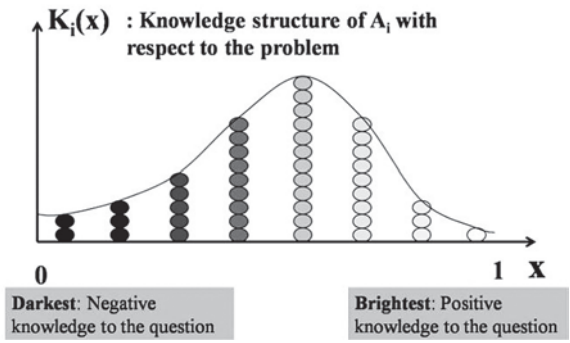

Figure 4: Knowledge function, Ki (x) of agent, Ai, where the knowledge is labeled by a parameter $0 \leq x \leq 1$.

A very important point to be noted here that it is quite impossible to see what knowledge is $K_i(x)$ of agent A_i is not directly observable. Then, why do we need it? It is because, even if the knowledge function is not directly observable, it describes smartly the state of brain and also because it plays important roles in decision making and message formation processes. The messages are expressed in tongues and are observable. However, we can believe in existence of such mathematical function, which represents distribution of elements of knowledge that influence decision making regarding the given problem. The mathematical function, as it has been defined here, describes a state of brain regarding the question and plays an important role in our modeling. The knowledge function introduced here can be compared with the wave function in quantum physics. The wave function is not an observable quantity but does describe a state of the system completely within the framework of quantum mechanics. In quantum mechanics, time development of wave function is described by the Schrödinger Equation. On the other hand, the time development of the knowledge function is described by the nonlinear process. The wave function relates to probability of getting a certain value of an observable physical quantity. Just like guessing at the wave function from a number of observations of physical quantity, we can guess at the knowledge function of an agent from a number of messages from the agent.

2.2.2 Decision Making Process in an Agent

An agent is a group of similar people regarding to the given problem. They have similar knowledge structure on the problem and behave similarly in decision making. For this reason, the decision making in an agent is simulated by a personal decision making. In order to have a mathematical formulation of the personal decision making, we note a linkage model of cognitive psychology (Weiner, 1980). Figure 5 shows how it works. When the brain is stimulated (in our case, it is done by the question: Do we accept nuclear energy plants for producing electricity?), some memories come up into mind. They link each other and make a sense, which lead to an answer to the question. This is a decision to the given problem.

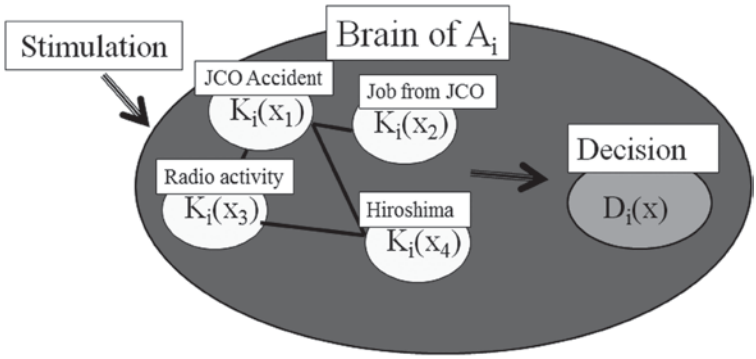

Figure 5: Linkage model of cognitive psychology

In this example, the idea of “nuclear energy” links to the memory of “radioactivity,” “a nuclear accident of a nuclear fuel company in Japan (JCO Nuclear Fuel Processing Facility, Tokai, Japan) in which two people died because of excessive exposure to nuclear radiation, and “an atomic bomb attack in Hiroshima at the end of World War II” - nuclear energy plants are noted as a dangerous things. Besides these negative (dark) memories, an employee of JCO has a decisive fact that he is employed by JCO (other people being benefited would have similar feelings). His conclusion would be like this: even though the nuclear energy plants may be dangerous to some extent, we must accept them and use them attentively. It is important to note here that what memories are linked, namely what memories are brought to mind, are not a deterministic process but is somehow stochastic in character. Accordingly, the conclusion is also nondeterministic. Cognitive psychology tells us that environmental factors also play important roles in decision making (Anderson, 1981).

Now, let us describe in further detail the mathematical model of decision making process in an agent for a given problem on the basis of the linkage model of cognitive psychology. It is expressed by the following mathematical procedure:

(1) Select N memories randomly with equal probability from all the memories of agent A_i. Then, we have a set of parameters x_m for m=1,2,…,N which corresponds to the selected knowledge.

(2) Calculate the mean value $\langle x \rangle = \frac{1}{N}\sum_{m=1}^{N} x_m$ and the mean square deviation $\sigma = \langle (x_m - \langle x \rangle)^2 \rangle$.

(3) Produce a decision function, which is assumed to be a Gaussian type,

$$D_i(x) = A\, e^{-\frac{(x-\langle x \rangle)^2}{\sigma^2}}$$

Here, the procedure (1) is mathematically equal to the following: select N Here, the procedure (1) is mathematically equal to the following: select N parameter x_m with the probability $K_i(x_m)$. Remember, the knowledge function, $K_i(x)$ is normalized. It can be used as the probability function. In the procedure (3), the shape of decision

function, $D_i(x)$ of agent A_i, is assumed to be of Gaussian type which has a well-defined peak at a well-defined value of x. This character matches with the idea of "decision." The character of decision regarding the problem can be expressed by the decision function. Because of the same reason as in the case of the knowledge function, the decision function should be normalized; namely,

$$\int_0^1 D_i(x)\,dx = 1$$

2.2.3 Message Producing Process in an Agent

Look at Fig. 3 again. When an agent reaches a conclusion, the agent wants to tell it to another agent. In our model, the message is produced on the basis of the conclusion and the knowledge of the agent. Mathematically, it is expressed as follows:

(4) Simply add $D_i(x)$ and $K_i(x)$ to produce message function, $M_i(x)$.

(5) Multiply a psychological factor, $C_{i,j}(x)$ to $M_i(x)$ to produce message function $M_{i,j}(x) = C_{i,j}(x)M_i(x)$. Here, the suffix i,j means the message is transferred from A_i to A_j.

(6) Normalize $M_{i,j}(x)$.

The character of the message regarding the problem is expressed by the message function. The reason why we consider the knowledge function as well as the decision function is that we use knowledge to express the conclusion. The example of the psychological factor is "authority effect" in cognitive psychology. Depending on the persons to talk to, the message is modified. The character of message of A_i to A_k is modified depending on A_j. Since this factor is difficult to assign in actual cases, for the moment, we assume that $C_{i,j}(x)=1$. The above procedure is simple but it is enough for expressing the character of message of the agent, A_i regarding the problem.

2.2.4 Knowledge Modification Process

The message of is now transferred to another agent and modifies the knowledge of agent . This process is mathematically expressed as the following:

(7) Multiply a psychological factor $C_{i,j}(x)$ to $M_{i,j}(x)$.

(8) Add $C_{i,j}(x)M_{i,j}(x)$ and $K_j(x)$ to produce a new knowledge function

$K_{(j\_new)}(x)=K_j(x)+C_{i,j}(x)M_{i,j}(x)$

(9) Normalize $K_{(j\_new)}(x)$.

The psychological factor is coming again from "authority effect" of cognitive psychology. Depending on from whom the message is received, the character of

knowledge is modified. In general, people do not receive the message exactly as it is told. This factor, again, is difficult to assign in actual cases, and for the moment, we assume $C_{i,j}(x)=1$.

2.2.5 Aging of Received Knowledge

People gradually forget their received knowledge. The ageing of received knowledge is well studied by psychologists [26]. There are two kinds of memory: temporal memory and eternal memory. The loss of memory is mathematically expressed by a factor $e^{-t/\tau}$, where τ is the parameter for the lifetime of the memory. The memory function described above is the long-term memory, which has a sufficiently large lifetime. But the received knowledge has a definite lifetime. So, ageing of received knowledge must be considered. Assume that agent A_j receives a message $M_{i,j}(x)$ from the agent A_i at time t=0, then the knowledge function, $K_j(x,t)$ of the agent A_j at time t is formed in the following procedure:

(10) Multiply an aging factor, $e^{-\frac{t}{\tau}}$ to $M_{I,j}(x)$

(11) Add $e^{-t/\tau}M_{i,j}(x)$ and $K_j(x)$ to produce aged knowledge function,

$$K_j(x,t) = e^{-t/\tau}M_{i,j}(x) + K_j(x)$$

(12) Normalize $K_j(x,t)$.

The details of the proposed artificial society model have been described in this section. In the model, decision making process is expressed mathematically. Therefore, it provides an algorithm for computer simulation of decision making processes in society.

Decision making is a mental process. Hence, psychological factors often play a very important role in decision making. But, this factor is not included in the present model. It will be included in the next version of the model.

2. 3 Preparation of knowledge functions of agents

In the process of the application of the psychology-oriented artificial society model, preparation of knowledge functions is the most important part of the work. In order to explain how to do it, let us go back to the definition of knowledge function which was described in Section 2.2.1. Look at Figure 3, where the ensemble of knowledge of an agent is shown. Each of the elements of the knowledge is labeled by an “influence parameter” x(x=0 is labeled to the knowledge completely negative to the question; x = 1 is labeled to the completely positive knowledge; and 0 < x < 1correspond the intermediate). As shown in Figure 4, we can produce the knowledge function of the agent if we arrange a lot of elements of the knowledge against the parameter x. Therefore, the method of obtaining the knowledge function of an agent is composed of the following two steps.

Step 1: Collection of elements of knowledge of an agent regarding a given problem.

Step 2: Labeling a value of influence parameter x to each of the elements of the knowledge.

One problem in Step 1 is that knowledge stored in human brain is not observable directly. But there is a method to guess the knowledge structure of an agent. It is to analyze messages from the agent. Note that message of an agent is formed from the knowledge of the agent (See Figure 2). The messages from an agent are samples of knowledge of the agent. There would be various methods to analyze messages from agents. We propose here "keyword analysis method" (KAM) to analyze messages from agents.

The keyword analysis method is composed of the following processes.

(1) The problem studied in the proposed artificial society model is expressed in the form of a question: "Do you support or accept (something: action of the problem) in order to (do something)?" Let us consider the previously mentioned problem in this regard. Therefore, the question becomes "Do we accept nuclear energy plants for producing electricity?"

(2) Two kinds of questionnaire surveys are carried out which correspond to Step 1 and Step 2. In the questionnaire of Step 1, the question mentioned in (1) is asked to the members of an agent. This question triggers thinking and some ideas related to the question come to their minds (See Figure 5). They are requested to write their answers freely in sentences.

(3) These sentences are analyzed by computers and "keywords" are extracted. One thing to be noted here is that there are some commercial software for keyword extraction. Also, some websites (e.g. http://fivefilters.org/term-extraction/) provide this facility for free. However, we prepared a software for this purpose with the aid of our research group members at the graduate school of Engineering at the Ibaraki University.

(4) In order to "fine tune" the keyword extraction process, keywords and key phrases (combination of keywords) extracted in (3) are tested by inserting them in a format: "Do you think the idea of (keyword/key phrase) leads to positive answer to the question?" If the inserted sentence makes sense, it is adopted as a question of the questionnaire in Step 2. The sentence is rewritten without changing its meaning in case the sentence is not fluent even if it makes sense. In such a way, questionnaire format of Step 2 is prepared. The respondents of the questionnaire of Step 2 are requested to answer "yes" or "no." The frequency of "yes" divided by the number of respondents gives the value of the influence parameter x.

(5) The number of a particular keyword counted in Step 1 versus the corresponding influence parameter x curve gives the knowledge function of the agent.

Again, we want to remind that the abovementioned process of obtaining knowledge function(s) of the agent(s) is the most important part of the modeling. When we have the agents and channel parameters of the communication channels between the agents and knowledge function(s), the rest of the work (carrying out computer simulations) is just a matter of time.

3. ICT-Enabled Services for agriculture in Bangladesh and their impacts

Bangladesh is a developing country in South Asia. The economy is mainly agriculture-based where about two-thirds of the population are directly or indirectly dependent on agriculture. The table below presents some facts about Bangladesh.

Table 1: Bangladesh country profile (Constitution of Bangladesh: a-b; AC Nielsen, 2011; BBS, 2010; BBS, 2012; BSS, 2013; WB, 2013; BD GOV, 2013)

Official name	People's Republic of Bangladesh		
Government	Unitary parliamentary democracy		
Gross national income per capita	$1,044		
	National	Urban	Rural
Population	150 million	38 million	112 million
Adult literacy	58%	68%	54%
Newspaper readers	40%	50%	36%
Mobile phone users	58%	80%	51%
Internet users	6.3%		
Voice communication coverage	Nationwide		
Data communication coverage	Nationwide		
Contribution of Agriculture to GDP	19.1%		
Workforce involved in Agriculture	48.1%		

Even though the contribution of Agriculture to GDP has been continuously decreasing over the last few years, Bangladesh is still very much an agrarian economy. With its contribution of about 19.1% of the country's GDP, agriculture remains the single largest producing sector of the economy where almost half (48.1%) of the country's labor force are directly involved (BD GOV, 2013)[1].

[1] According to "CIA-The World Factbook," contribution of agriculture sector to GDP is 18.4% and manpower involved in agriculture is 45% [9].

Farmers in rural Bangladesh are experienced and knowledgeable as they have the traditional cultivation skills passed through generations by inheritance; “such experience and ‘historic’ knowledge provide these farmers with a firm foundation, many of them operate outside of any meaningful information society, resulting in knowledge stagnation” (Katalyst, 2012: pp. 01). As a result, the farmers often miss opportunities of extra income as well as seem to be vulnerable to new challenges such as new crop diseases.

3.1 ICT-Enabled services for agriculture in Bangladesh

Farmers are the traditional innovators in agriculture, and actively engage in communication about innovation. ICT provides a new channel for this communication. The key for development actors is to understand the traditional process of farmer innovation in order to succeed in bringing ICT in line to support this (e-agriculture, 2012). There are a number of applications and ICT-Enabled tools used for dissemination of agricultural information for the farmers. Digital Green (India), e-Arik (India), e-Choupal (India), AgriNet Uganda Ltd (Uganda), iCow (Kenya), VERCON Egypt (Egypt), Farm Cloud (UK) are some of such ICT-Enabled tools[2] that have had positive impacts in different parts of the world including India, the closest neighbor to Bangladesh. In Bangladesh also, initiatives, by both the GOs and NGOs, have been taken to bring required information to the farmers’ doorsteps with the aid of ICT.

Katalyst, a market development project jointly funded by SDC, UK government, CIDA and EKN (Katalyst-BD website), is the pioneer in introducing ICT-Enabled services to the Bangladeshi farmers. In December 2005, Katalyst launched the first ever Rural ICT Center (RIC) in collaboration with two local NGOs: Broadlink and the Digital Equality Network (DEN).

In early 2006, Katalyst and Grameenphone joined forces to focus on the commercial viability of the CIC business model, with Katalyst assisting GP to study the usefulness of the information services then provided by GP’s 16 CICs. In January 2007, with the aim of substantially adding to the capacity of these CICs (which had been established with GSMA support[3]), Katalyst signed a MoU to jointly establish another 184 new CICs, aiming to bring the total to 200 across Bangladesh (Katalyst, 2012: pp. 10). By November 2009, the number of GPCICs reached 100. Now, over 500 GPCICs are in operation.

In 2009, Katalyst launched e-krishok (translation: e-farmer) campaign which eventually shaped into a web-service, an add-on to the CIC model. In collaboration with BIID, the e-krishok web-portal (http://www.ekrishok.com) was launched. It offers free-of-charge service to the registered farmers.

[2] For a comprehensive list see [11], pp. 7-9

[3] GSMA is an association that represents the interests of approximately 800 mobile operators worldwide (see GSMA website for details: www.gsma.com)

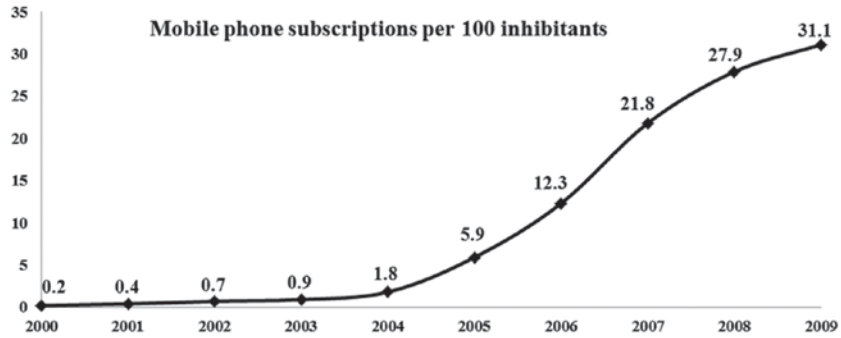

Figure 6: Growth in mobile phone subscriptions, Bangladesh (2000-2009)

In early 2008, nearly three-quarters of all rural Bangladeshi citizens were unaware of the Internet. On the other hand, between 2000 and 2009, mobile phone penetration increased explosively (AT Capital Research, 2010).

Katalyst decided to capitalize on this and collaborated with Banglalink which led them to launching a voice-based service delivery system (Banglalink Agriculture Helpline (krishi jigyasha 7676)) (KATALYST, 2012; Banglalink Jigyasa). This service had two major advantages: side-stepping literacy among the farmers and enabling them to access the information instantaneously from their fields, as well as avoiding the connectivity and speed difficulties and service down-time problems faced by telecentres (CICs). The increment rate of mobile penetration in the next three years (Table 2) proved Katalyst's strategy even more appropriate.

SRDI, an agency under the Ministry of Agriculture, Bangladesh, completed the analysis of soil samples for unions across over 450 upazilas or sub-districts (90% of total upazilas nationwide), and collated the results into a voluminous book, largely unusable by anyone aside from a soil scientist. In order to make their database useful for general farmers, SRDI launch the Digital Fertilizer Recommendation Services in 30 upazilas on 27 July 2009 which expanded throughout the country later on. Farmers from any corner of the country can get fertilizer recommendation based on soil fertility of their field and crop requirement through Mobile Phone (7676 of Banglalink) and GPCICs. Farmers need to provide

Table 2: Active subscriber base of major telecoms operators (in million)

Telecom Operator/Network	2009	2010	2012
Grameenphone Ltd (GP)	21.98	31.14	39.29
Orascom Telecom Bangladesh Ltd (Banglalink)	12.13	20.18	25.49
Robi Axiata Limited (Robi)	10.56	12.81	19.21
Airtel Bangladesh Limited	2.69	4.37	6.73
Pacific Bangladesh Telecom Ltd (Citycell)	1.97	1.79	1.70
Teletalk Bangladesh Ltd (Teletalk)	1.07	1.22	1.36
Total	**50.4**	**71.5**	**93.8**

Source: BTRC, Sept 2009, May 2010, Jun 2012

the name of their unions, upazilas, districts, land types and desired crops in order to get the fertilizer recommendation.

3.2 Impacts of ICT-Enabled Services

According to the Katalyst Annual Report 2011, cumulative access outreach from March 2008 to June 2011 was about 1.5 million from the GP CICs, while the cumulative benefit outreach was about 0.6 million (all services direct & indirect) (Katalyst, 2011).

Banglalink Agriculture helpline attended 32,904 calls (22% repeat calls) between January 2011 and December 2011 (Katalyst, 2011).

As of March 2012, the FRS had provided recommendations to approximately 2,700 users, the vast majority of whom availed recommendations in 2009-10 following the service's initial launching, suggesting that the FRS requires targeted and continuous promotion until the availability of the service becomes far better known and accepted locally (Katalyst, 2012: pp. 19).

Since its launching in 2012, the e-krishok web-portal has provided solutions to 3,163 queries from the farmers (e-krishok website).

The number of the farmers who took IT-enabled services (as stated in previous three paragraphs) is not really impressive. Till now, just over 1.5 million people accessed the services which is about 2% of the farmers. From this, it can be concluded that the acceptance of new technology or new sources of information (ICT-Enabled services in particular) is still very low among the farmers in rural Bangladesh.

4. Analyzing the decision making process regarding the acceptance of ICT-Enabled Services among the farmers

Discussion in the previous section takes us to the fact that the acceptance of ICT-Enabled services among the farmers is still very slow. There could be a number reasons behind this. It was mentioned earlier that when a new idea or innovation is introduced, a decision making process takes place in the society. In a democratic society, different groups of people in the society as well as different institutions/organizations participate in such a process and influence the process, sometimes even without noticing the fact. If we consider the acceptance of ICT-Enabled services among the Bangladeshi farmers, quite a few influencing factors can be noted such as:

* The quality of content and delivery system
* Credibility of the information source
* Credibility of the communication channel
* Risk involved in using the new services/information

* Literacy of the farmers
* Access to the services
* Ease of use
* Cost of the services, etc.

In order to understand the influencing factors regarding the acceptance of ICT-Enabled services among the farmers with the aid of Psychology-Oriented Artificial Society Model of Decision Making, the following works are needed to be carried out:

A. Formulation of an ASM on the basis of the present issue
B. Computer simulations

4.1 Formulation of an ASM on the basis of the present issue

Formulation of an ASM includes the following tasks:

a) Selection of agents,
b) Definition and characterization of channels between agents,
c) Preparation of knowledge functions of agents.

In the following subsections, these are described in detail.

4.1.1 Selection of agents

Considering the present situation regarding the issue in focus, i.e. acceptance of ICT-enabled services among Bangladeshi farmers, the following could be noted as the potential agents- (1) Farmers (FM), (2) Government Organizations (GOs) such as: the Department of Agricultural Extension, (3) Non-Government Organizations (NGOs) working in the agriculture sector, (5) Opinion Leaders (OL), and (5) the Mass media (MM). Hereafter, these agents are expressed in abbreviation. The reasons why these agents are being considered are as follows:

(1) The farmers are the target group. They will be affected the most from accepting (or not accepting) the ICT-enabled services for agriculture. Also, they are at the most powerful position to accept or reject new innovations, ideas or technologies in agriculture.

(2) Bangladesh is a densely populated country and has an agrarian economy. Agriculture is still the single largest production sector of the economy where almost half of the country's labor force are directly involved. Not only that, the country's food security completely depends on continuous development in agriculture. So, naturally, the Government would be very much interested in introducing new ideas and innovations that may improve the quality of farming and quantity of production. And, as the GOs like the Department of Agricultural Extension work very closely with the farmers, they can motivate and influence the farmers in accepting new ideas and innovations.

(3) The NGOs working in the field of agriculture have both interests of social development and business which make them a very important stakeholder regarding with regards to the present issue.

(4) Opinion Leaders (Katz and Lazarsfeld, 1957) play very important role in decision making process regarding any issue in rural societies. As the present issue is concerned with agriculture and hence bound to rural societies, assuming Opinion Leaders as one of the most influential agents in the process is quite logical.

(5) MM is a very important agent in almost any social issue. It works as the main source of information and ensures constant flow of public information or news about events occurring within the country and in the world. By providing information, MM works as the "agent of social change" and play important roles in changing of attitudes, beliefs, and social norms (Bryson, 1948; Schramm, 1964; Schramm and Roberts, 1971). On the other hand, thoughts and opinions from different parts of the society on a particular problem are also reflected in MM. In this way, MM works as a bridge between different parts of the society. Altogether, MM becomes a very important agent for almost any kind of decision making process in the society.

The abovementioned agents are only "potential agents." More agents may need to be included or one or more agents might need to be excluded from these agents during the actual work. The issue of inclusion/exclusion of MM as an agent in the present study can be taken as an example in this regard. Several studies (such as Katz, 1957) have shown that opinion leaders have more influence on people's opinions, actions, and behaviors than the media. Also, the newspaper readership is only 36% in rural Bangladesh. On the basis of these facts, the inclusion/exclusion of MM as an agent can be reconsidered after further literature review and primary survey.

4.1.2 Definition and characterization of channels between agents

In the present study there are five potential agents. So, there would be ${}_5P_2 = 20$ channels among the agents. But, some of those channels might be found inactive. After the active channels are noted comes calculation of the "Audience Rating Coefficients" and "Effective Capacity" of the channels (Quarmal et. al., 2013).

4.1.3 Preparation of knowledge functions of agents

Knowledge functions of agents will be done by Keyword Analysis Method described in section 2.3.

After carrying out the works described in section 4.1.1, 4.1.2 and 4.1.3, the next task is to carry out computer simulations using the data gathered through these procedures.

5. Concluding remarks

Rapid and continuous development in agriculture is of utmost importance for a country like Bangladesh. Experience from other countries show that the ICT-enabled services can effectively improve the quality of farming which can effectively increase production as well as can improve the farmers' lives. Therefore, acceptance of such innovations seems to be quite important for Bangladeshi farmers. Data presented in this paper shows that the acceptance process of ICT-enabled services for agriculture among Bangladeshi farmers is still very slow. Considering the importance of the issue, investigations need to be carried out into the reasons behind it which may help to regulate the process positively. From this point of view, a work is proposed for analyzing the decision making process regarding the issue with the aid of an Artificial Society Model presented by the authors. From such analyses:

1. It is possible to understand the present situation regarding the issue being analyzed. Also, it enables us to make projections of future situations.
2. It is possible to determine the effectiveness of various communication channels.
4. The factors and agents influencing the process can be noted which will enable us to regulate the process in a desired way.

It is expected that the proposed work will provide a clear understanding of the situation regarding the present issue and will help the stakeholders to take necessary steps in order to regulate the process positively.

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e-Krishok - A Service Brand to Develop and Promote ICT Enabled Solutions Targeted to Farmers and Agro-Businesses

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Abstract

e-Krishok is an agricultural extension service designed to deliver information, advisory and market linkage facilities through ICT tools. It started as a campaign for ICT enabled information and advisory service, which has been transformed into a full range service basket, including business planning and market linkage, to meet the demands in the agro-value chain. e-Krishok seeks to address the major constraints in the agro-value chain, which are: (a) lack of relevant and timely agricultural information and know-how, and (b) lack of market facilities where producers can sell their goods at fair prices. e-Krishok is founded on the premise that innovation and learning can be the driving forces behind development and advancement, and ICT provides immense opportunities in this sector. It also takes into account the fact that farmers learn the best from each other and therefore e-Krishok entails creating a network of farmers through which they can share their knowledge and experiences with each other in a participatory manner. Finally, e-Krishok also creates a brand vision through which farmers feel ownership and a sense of belonging. “16250,” Market Linkage Program (MLP) and Farmbook are the various services available through e-Krishok.

Keywords

Agriculture, Mobile, Telecenter

Introduction

Development can be achieved predominantly through innovation. This strong belief prompted BIID to launch the e-Krishok campaign in 2008 which focuses on innovation through the usage of ICT tools in agricultural value chain. The e-Krishok campaign started as an information delivery system for the rural farmers and gradually evolved into a 360 degree solution for agricultural extension in Bangladesh. Katalyst is a development project aimed at contributing to alleviate poverty through creation of jobs and income by facilitating measures to enhance competitiveness of small and medium enterprises, rural entrepreneurs and farmers.

Initially, BIID began the e-Krishok campaign as a co-facilitator of Katalyst Bangladesh in developing the ICT services market with pro-poor orientation. BIID partnered with Katalyst and Grameenphone (GP), the largest tele-communication service provider in Bangladesh, to support its Community Information Center (CIC) initiative. Gradually, this initiative evolved into the e-Krishok service.

Information and communication have always mattered in agriculture. Ever since people have started growing crops, raising livestock, and catching fish, they have sought information from one another. Farmers in a village may have planted the "same" crop for centuries, but over time, weather patterns and soil conditions change and epidemics of pests and diseases come and go. Updated information allows the farmers to cope up with and even benefit from these changes. Providing such knowledge can be challenging, however, because of the highly localized nature of agriculture. This means that information must be tailored specifically for distinct conditions. Besides, in a fast growing and expanding world, the value of crops largely depend on access to market, market and price information and the

most effective delivery of goods and services. e-Krishok sought to address such issues in the agricultural value chain.

Myth about Information and Communication Technologies (ICTs) and e-Agriculture

What exactly are ICTs? What ICT can do for the agriculture sector? And can they really be useful and cost-effective for poor farmers, who have restricted access to capital, power supply, and infrastructure? First, an ICT is any device, tool, or application that permits the exchange or collection of data through interaction or transmission. ICT is an umbrella term that includes anything ranging from radio to satellite imagery to mobile phones or electronic money transfers. Second, these ICTs and others have gained traction even in impoverished regions. The increases in their affordability, accessibility, and adaptability have resulted in their use even within rural homesteads relying on agriculture. New, small devices (such as multifunctional mobile phones and nanotechnology for food safety), infrastructure (such as mobile telecommunications networks and cloud computing facilities), and especially applications (for example, that transfer money or track an item moving through a global supply chain) have proliferated. Many of the questions asked by farmers (including questions on how to increase yields, access markets, and adapt to weather conditions) can now be answered faster, with greater ease, and increased accuracy. Many of the questions can also be answered with a dialogue - where farmers, experts, and government can select best solutions based on a diverse set of expertise and experience.

The types of ICT-enabled services that are useful for improving the capacity and livelihoods of poor smallholders are growing quickly. One of the best examples of these services is the use of mobile phones as a platform for exchanging information through short messaging services (SMS). ICT-enabled services often use multiple technologies to provide information, especially, in resource-constrained environments, providers use satellites or remote sensors (to gather temperature data), Internet (to store large amounts of data), and mobile phones (to disseminate temperature information to remote farmers cheaply) — to prevent crop losses and mitigate effects from natural adversities. Other, more-specialized applications, such as the software used for supply chain or financial management are also becoming more relevant in smallholder farming. Simple accounting software has allowed cooperatives to manage production, aggregation, and sales with increased accuracy. Hundreds of agriculture-specific applications are now emerging and are showing great promise for smallholders. For exploiting the possibilities, countries have two things to do:

(A) Empower poor farmers with information and communication assets and services that will increase their productivity and incomes as well as protect their food security and livelihoods; and

(B) Harness ICTs effectively to compete in complex, rapidly changing global markets (avoiding falling behind the technology curve).

Accomplishing these tasks requires the implementation of a complex set of policy, investment, innovation, and capacity-building measures, in concert with beneficiaries and other partners, which will encourage the growth of locally appropriate, affordable, and sustainable ICT infrastructure, tools, applications, and services for the rural economy.

e-Krishok: A 360-degree Solution

Farmers often have to face various challenges in their day to day agricultural practices. Among these challenges, getting necessary and accurate information is a major one. Farmers often incur losses due to pest or disease attacks since they do not always have the knowledge about the appropriate remedies. Another major challenge is getting fair prices for their produces. If there is no market for the products to be sold profitably, then the behavioral changes induced by access to information will not benefit the farmers in the long run. The process of change and growth entails more than just increasing access to information.

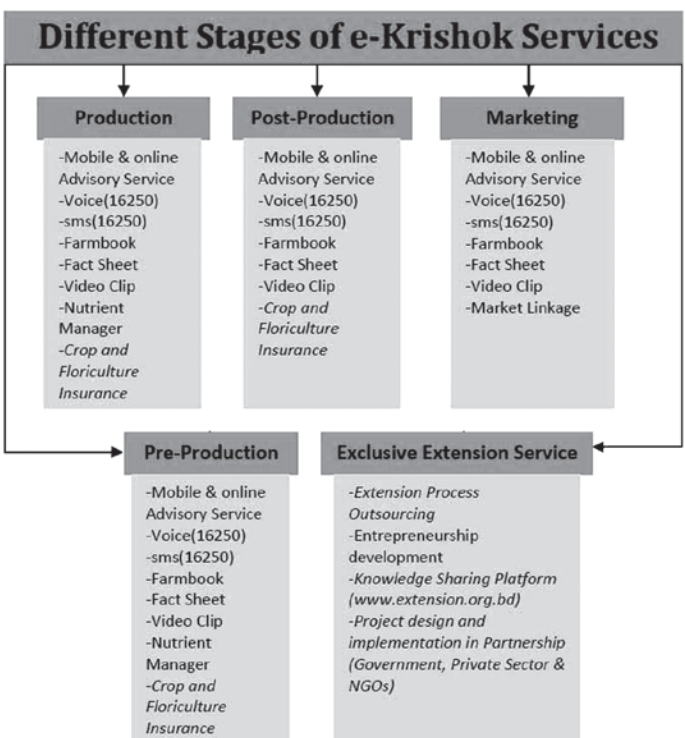
Therefore, integrating the farmers into markets via the provision of market-related information (e.g. prices in various local and national markets, quality requirements and standards, market demand, etc.) is very important. ***e-Krishok is an agricultural extension service designed to deliver information, advisory and market linkage facilities through ICT tools to farmers and agri-businesses. It is a dynamic process that involves progression from information and advisory service towards developing market linkages, and providing a full range of ICT enabled solutions for extension services.***

Before launching the e-Krishok program, several critical questions were resolved which were decisive in developing the service basket. They are as follows:

* What types of information and advisory services do farmers need, and when?
* Through what means the information should be delivered so that farmers can use it most effectively?

* How can information and advisory service contribute to increased productivity and enhance farmers' benefits?
* Are farmers evidently benefitted with the use of information and advisory services?
* How can ICT be sued to provide information and advisory services?

A farmer's opinion with regards to these questions is very important and incorporating those opinions through their direct participation is necessary. Since in most cases ICT is a new thing for farmers, it is indispensable that they take part in the adoption process and exchange their views on this matter. Therefore, e-krishok also creates a network of farmers through which they can exchange their ideas and experiences among each other. Besides, it also seeks to include a network of different national and regional organizations, agriculturists and specialist in the field of agriculture so that new technologies and methods can also be delivered to the doorsteps of the farmers.



Concept, Context and Fundamentals of the Campaign

The ultimate goal of e-Krishok is to contribute to economic growth and improved the livelihoods of the rural people by ensuring access to information though ICT enabled delivery mechanisms. Economic activities in the rural areas are mainly, if not entirely, agro-based.

e-Krishok is a campaign that seeks to address the following constraints to farm productivity:

1. Lack of access to relevant agricultural information and know-how is one of the critical constraints faced by farmers that result in
    * damage of crops and/or low output
    * loss of potential farming opportunities
2. Farmers' access to seeds, fertilizers, pesticides, better farming methods and other support programs and services can be improved significantly by facilitating their access to timely and appropriate information and counseling.

The Campaign builds on the opportunity that-

Farmers learn best from each other and have trust and confidence in each other. In order to get farmers to use services of a tele-center, an effective strategy would be to develop a mechanism to harness their collective information and knowledge about issues and opportunities in farming to understand their specific needs for better farming. And through this campaign, we can get them to participate in service development and delivery through Tele-center.

What is e-Krishok?

It is a campaign for promoting ICT enabled services delivered through Tele-centers among farmers. The campaign undertakes to demonstrate that a farmer, who uses agriculture related information, training and other support services provided by its nearest Tele-center, maximizes his/her economic gain. Hence, he/she can achieve income growth through agricultural activities. A farmer of this kind is an e-Krishok.

What do we aim to achieve through e-Krishok?

Develop a network of farmers who actively seek information and other support services to improve their agricultural practices and thus gain benefits. On a secondary level, e-Krishok aims to build capacity of the Tele-centers in making information, knowledge and relevant support services available to farmers in order to facilitate farmers' access to very specific and timely information and knowledge (know-how) that they can apply to prevent and/or solve agro-based problems.

How?

Ensuring that a Tele-center develops contacts with farmers, organizing events to encourage knowledge sharing and group based learning among farmers so that in the process critical needs and concerns of the farmers are identified and

Branding Aspects

'e-Krishok' is branding of a campaign as well a network of farmers.

- *Desired attributes of the brand*
  e-Krishok will bring to mind – a successful farmer of rural Bangladesh who is member of a network of farmers. (S)He wants to share with other farmers the secret to his success.
- *Benefits proposed by the brand*
  The campaign undertakes to demonstrate that a farmer who uses agriculture related information, training and other support services provided by nearest tele-center maximizes his/her economic gain. Hence, (s)he can achieve income growth through agricultural activities. A farmer of this kind is an e-Krishok.
- *Culture/values that the brand aims to promote*
  One farmer's problem can affect many others
  Likewise, one farmer's success can lead others to become successful
  Let us come together to share what we know
  Let us come together to learn what we don't know

recommendations are also generated on how to improve on existing provisions (content, delivery mechanism, post-delivery supports) of services through a Tele-center.

Rationale for the Campaign

The major issue in getting farmers to visit information centers for agricultural information and services turns out to be the prevalent "mindset" of the farmers. They usually turn to more experienced or elderly farmers and at times The Government of Bangladesh's (GoB) extension workers, known as block supervisors/sub-assistant agriculture officers, for necessary information and advice. They are not familiar with an ICT center, nor are they able to perceive the use and benefits of ICTs. A combination of promotional tools has been used in motivating several target groups at the same time including farmers and students. But, those have proved to be ineffective in reaching farmers. Hence, the need for more engaging and interactive campaign with specific focus on demonstrating values of CICs through need-based responsive information and services for farmers emerged. With that in view, e-Krishok campaign evolved as a strategy to promote agricultural information and services delivered through GP CICs (Tele-centers) during its initial phases. The strategic objective of the campaign was to induce behavioral change/change in the mindset by face-to-face interaction with a group of identified farmers through center-based events, thus familiarizing them with CICs and use of ICT based services in agriculture. Elderly farmers, local block supervisors (Sub-Assistant Agriculture Officers of GoB's Department of

Agricultural Extension) were involved in the interactions so that farmers are motivated to recognize CICs as credible, dependable and familiar sources of information and advice. Later BIID developed its own brand of Tele-centers named Batighar (meaning the lighthouse) through which e-Krishok is being delivered along with a bundle of other services.

Activities and Outcome in the pilot phase

The campaign was launched in Oct 2008 on an experimental basis to demonstrate the benefits of information and services available at the ICT centers to a critical of mass of farmers in 10 GPCIC locations. The campaign envisioned the following progressive phases to realize the end goal:

Phase 1: Local level farmers' group formation and specific problem identification

Phase 2: Problem specific consultation through the ICT centers

Phase 3: Beneficiary identification and assessment of benefits realized

Batighar : The Lighthouse of Information Shared access point for farmers

Batighar is derived from the English word "lighthouse," meant to show people the right direction. In its quest for facilitating provision of convenient, reliable and affordable access to ICT and its application to people at the bottom of the pyramid, it developed the Batighar - a network of Tele-centers for information and outreach. On the whole, the Batighar model aims to create a sustainable provision for easy access to information on different vital livelihood sectors such as agriculture, health, education and financial services and other relevant services by using ICT tools. It is based on a holistic approach and economic viability with precise understanding of livelihoods and local economic activities.

The goal of Batighar is to establish a knowledge-based sustainable network of information centers to deliver social and commercial services at the rural level in Bangladesh in order to empower the local communities. The objectives of Batighar are:

* Building awareness among the farmers and educating them so that they can use Batighar for any agriculture (including poultry, fishery and livestock) related information and advice, quality of inputs and avail advisory services on other related issues.

* Establishing Batighar Tele-centers in 500 Locations and targeting to reach all union parishads by 2015.

* Developing contents on agriculture MSME (Micro Small and Medium Enterprises) education, health, environment, citizen services etc. to be

delivered to the public through Batighar.

* Collaborate to develop partnership with different stakeholders to mobilize resources to implement various activities and introduce new services.

The Batighar services is an info center established in the semi-urban and rural areas as a multi-service delivery platform. It is a franchise network for ensuring quality of the services by upholding set standards and guidelines. The model includes value added services like SMS-based information for farmers, tele-medicine and back office support through help desks. The network is managed and facilitated by BIID through entrepreneurial capacity building.

Through its services, the Batighar has been changing the lives of thousands of people that it had come across. It has become a source of employment for the entrepreneurs who chose to be self-employed rather than being hopeless and unemployed. Through the e-Krishok service, thousands of farmers have been able to increase their productivity and reduce losses. The e-Clinic service has made it possible for the poor rural people to avail quality health services at affordable prices. Similarly, the job and education related services have empowered the people of the various communities. Thus, not just a technological structure, the Batighar telecenter network has emerged as a social revolution. It has also gained nationwide recognition and thereby guiding the rural marginal people towards their chosen destiny.

Case Study

The Mirza Nagar village is 12km from Kapashia upazila in Gazipur. Agriculture is the primary means of livelihood in this village. Over the past decades, there have been diversification of crops and practices in this village. However, farmers yet do not have adequate knowledge on modern technologies on farming. On the other hand, changes in climatic conditions over the years has resulted in changes in crop patterns as well as in epidemics of pests and diseases. But there is still no provision of timely and appropriate information or advisory services in the village although such facilities could have saved the farmers from incurring losses.

Sadir Uddin Pradhan is a resident of this village. His family comprise his wife and

three children. He has a lychee orchard of nineteen trees on 14 decimal of land. He learned about growing lychees from his fellow famers and input suppliers and with whatever knowledge he has gathered, he now made a profit of around 8-10 thousand taka each year from selling his fruits in advance to the wholesaler. He has knowledge on proper methods of taking care of his grooves and whenever he faces any problem, he takes advice from his input supplier. Once, his fruits were falling off before reaching maturity and he did not know what to do about it. Then one of his neighbors suggested him to visit the community information (CIC) center at Aralbazar. Thus he went to the CIC and described his problem. The query was sent to an agriculturist in Dhaka who then provided him with the solution. He was advised to apply a pesticide named Ripcord in a solution of 100 litres of water and spray it on the trees. This finally saved his fruits and he earned 20,000 taka during that season.

Market Linkage Program (MLP)

The service basket of BIID covered mostly extension related information and advisory services with a network of more than 150,000 farmers and a network of over 500 information centres. To address the demands of farmers (e-Krishok members) for marketing (selling) their produces at reasonable prices, BIID realized the need for a platform to facilitate the process.

The ongoing partnership with Grameenphone, ACI Limited and Katalyst ignited the thought of formulating a strategic partnership among the organizations to foster the development of an ICT enabled trading platform to connect the farmers to the market. Eastern Bank Limited joined the consortium as the banking partner for settling payment issues (as per regulatory requirements).

Inspired by Telenor's e-Mandi project in Pakistan to remove trade barriers in the agriculture value-chain, an insight has been developed that reveals some weaknesses in the Bangladeshi agriculture value chain:

* Sellers at all levels are primarily price takers – have to accept prices offered
* Uncontrolled supply driven system; no integrated production & harvest planning
* Intermediaries' influence on price and procurement process
* Uncertainty in product quality/grading

In order to remedy parts of the weaknesses in the value-chain, partners propose to create a virtual marketplace (Market Linkage Program) for players in the value chain including farmers, local traders and wholesale/retail traders:

Step 1: Start with market information

Step 2: Open up platform for direct upstream sales

Step 3: Establish an online marketplace and value added services for agri products

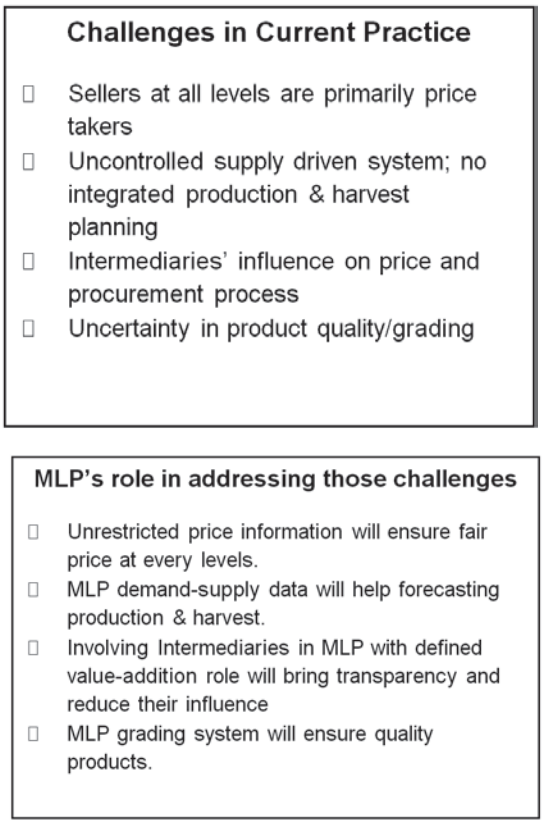
To verify the impact on the value chain, partners agreed to conduct a 12-month pilot programme using a customized version of the MLP platform developed for the e-Mandi project in Pakistan, but later on GP developed a new platform

Survey reveals that the challenges in current value chain may be remedied with an MLP-solution.

In March 2010, GP, BIID and Katalyst jointly conducted a survey on MLP value chain in Bogra, Rajshahi and Karwan Bazaar, Dhaka to understand the existing Agri Commodity Trade mechanism. Findings from this survey indicated certain areas that an MLP-solution could remedy.

Farmbook

Farmbook is an ICT enabled business planning and marketing tool for farmers which makes them more efficient in production and marketing. To pilot Farmbook,



Jessore was identified as a potential location as it is one of the leading districts to integrate ICT at the government level under Digital Bangladesh campaign.

16250

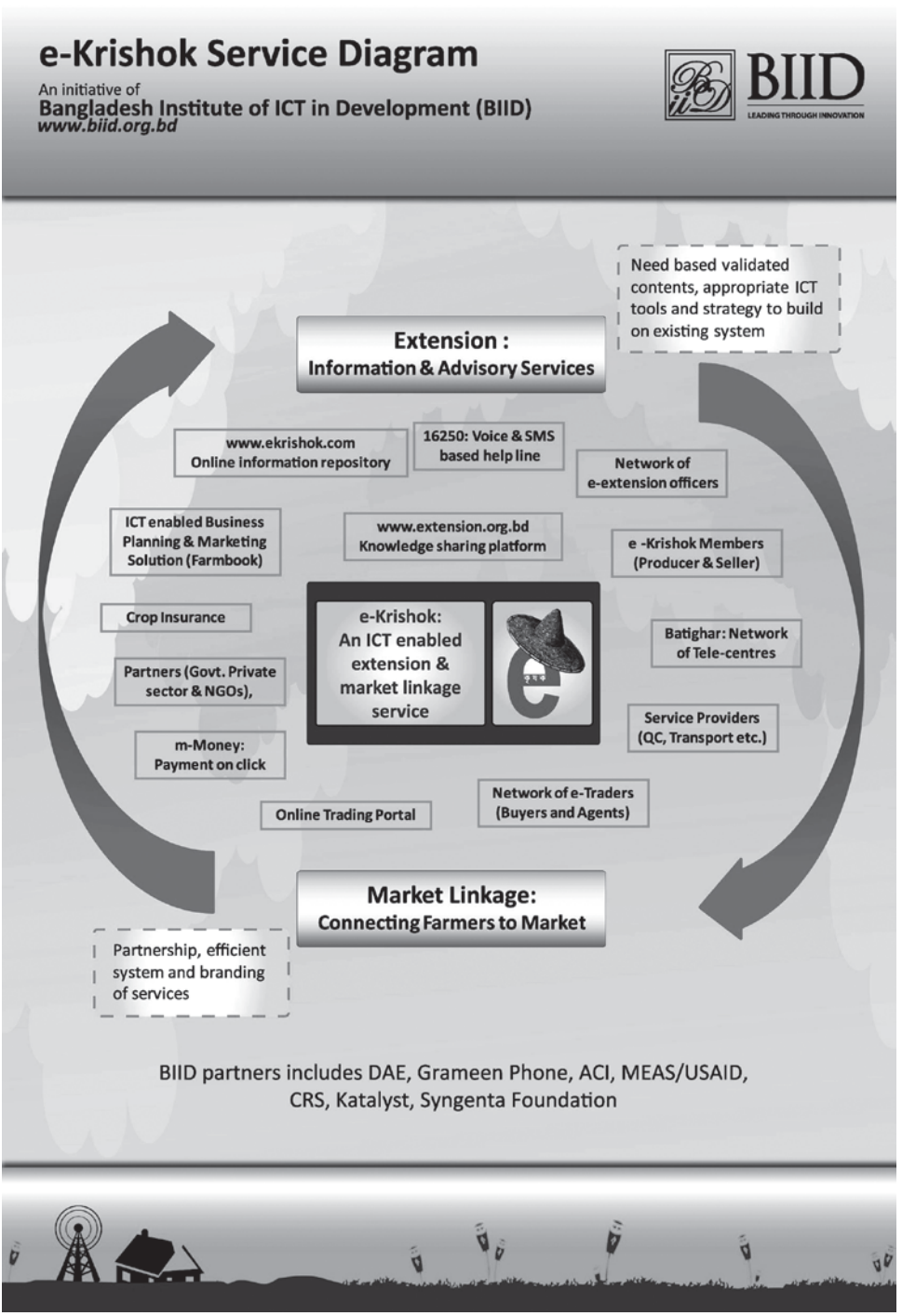
16250 is a short code based e-information service dedicated to offer a wide range of agricultural information and advisory services. This is available through voice and SMS. BIID envisages to address the farmers' need for extension and market linkage services through mobile phone. The service areas of 16250 are agriculture, livestock, fishery and poultry. The features of 16250 are:

* Call Back & Voice service - any query related to the information areas
* SMS service - registration, subscription, individual content
* Vast, in-depth, validated, reliable and updated content
* Service provided by trained agriculturists and experts
* Feedback mechanism to improve the service
* Reporting system to analyze customer needs

Conclusion

One of the most effective ways of reducing poverty is to invest in and make improvements in the agriculture sector. Even after years of industrialization and growth in services, agriculture still accounts for one-third of the gross domestic products (GDP) and three-quarters of employment in Bangladesh. Over 40 percent of the labor force in countries with per capita incomes in the US$4,000-$1,800 range works in agriculture (World Bank 2008). Because agriculture accounts for the vast majority of the poor's livelihood, it is also the sector that holds the most promises for pro-poor economic growth. In fact, agriculture is around four times more effective at raising incomes among the poor than other sectors (World Bank 2008).

Given the challenges, the arrival of information and communication technology (ICT) is well timed. The benefits of the green revolution greatly improved agricultural productivity. However, there is a demonstrable need for a new revolution that will bring lower prices for consumers (through reduced waste and more-efficient supply chain management), contribute to "smart" agriculture, and incentivize farmers (for example, through higher income) to increase their production. Public and private sector actors have long been on the search for effective solutions to address both the long- and short-term challenges in agriculture, including how to answer the abundant information needs of farmers. ICT is one of these solutions, and has recently unleashed incredible potential to improve agriculture in developing countries specifically. Technology has taken an enormous leap beyond the costly, bulky, energy-consuming equipment once available to the very few to store and analyze agricultural and scientific data. With the booming mobile, wireless, and Internet industries, ICT has found a foothold even in poor smallholder farms and in their activities. The ability of ICTs to bring refreshed momentum to agriculture appears even more compelling in light of rising investments in agricultural research, the private sector's strong interest in the development and spread of ICTs, and the upsurge of organizations committed to the agricultural development agenda.


e-Krishok Service Diagram
An initiative of
Bangladesh Institute of ICT in Development (BIID)
www.biid.org.bd
BIID
LEADING THROUGH INNOVATION
Need based validated contents, appropriate ICT tools and strategy to build on existing system
Extension : Information & Advisory Services
www.ekrishok.com Online information repository
16250: Voice & SMS based help line
Network of e-extension officers
ICT enabled Business Planning & Marketing Solution (Farmbook)
www.extension.org.bd Knowledge sharing platform
e -Krishok Members (Producer & Seller)
Crop Insurance
e-Krishok: An ICT enabled extension & market linkage service
Batighar: Network of Tele-centres
Partners (Govt. Private sector & NGOs),
Service Providers (QC, Transport etc.)
m-Money: Payment on click
Network of e-Traders (Buyers and Agents)
Online Trading Portal
Market Linkage: Connecting Farmers to Market
Partnership, efficient system and branding of services
BIID partners includes DAE, Grameen Phone, ACI, MEAS/USAID, CRS, Katalyst, Syngenta Foundation

Importantly, ICT is not an end to agricultural development. The excitement generated by ICTs as they spread throughout developing countries has often masked the fact that their contributions to agriculture are both rapidly evolving and poorly understood. It is too early to have a clear idea, supported by rigorous analysis, of how ICTs support agricultural development, and under what conditions. While there is credible evidence of positive impact, questions remain about how to make these innovations replicable, scalable, and sustainable for a larger and more diverse population. Therefore, on a research and policy level, the central goal of e-Krishok remains is to analyze and disseminate evidence of the impact of ICTs on agricultural development and rural poverty reduction, exploring opportunities for long-term and extensive efforts.

Apple Communication via Twitter in Indonesia: Study of Tweets, Retweets, and Hour of Retweets

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Abstract

Twitter is one of the most widely used social networking/social media sites. It is used by millions – both individuals and organizations – around the world to communicate. One of the benefits is creating “word of mouth” marketing. The research was conducted on Twitter accounts of Apple’s distributors in Indonesia. This research is based on various previous studies found in journals and theses on community forums, Internet, micro-blogging, user influence, similarity between communities on Twitter, corporate accounts on Twitter and implications of word of mouth. Five theories were used as the foundation: Computer Mediated Communication (CMC), Word of Mouth Marketing, Consumer Buying Decision, Social Media, and Twitter. The method was analyzing contents of the Apple distributors: iBox, Infinite, EMAX, and eStore. Results from the research show that based on topic, conversations are the most tweeted ones. In case of retweets, the most dominant topic is Apple information. In case of hourly retweets received, the time of receiving the highest retweets varied from brand to brand. The conclusion of this research is that if brands aim to receive high retweets, then the current tweeted topics need to be adjusted.

Keywords

Apple, Twitter, Social Media, Microblogging, WOMM, Tweet, Retweet

Introduction

Social Media and Brand

The industrial media paradigm is dominated by television, newspaper, radio, magazines and one-way static broadcasting techniques that distribute expensive content from advertisers. New web technologies have made it easy for everyone to create and distribute their own content via blog posts, tweets, or YouTube video, enabling advertisers to pay only minimum sums of money (Zarella, 2010, p. 2-3). This new media, or web 2.0 as coined by Tim O'Reilly (2005, p. 1), has created numerous impacts on the usage of Internet. By definition, web 2.0 according to McAfee (2009, p. 45-46) is a business revolution in the computer industry that makes Internet act as a platform.

Platform in this case is for businesses to communicate with their audience. In this era, one of the most influential platforms is the social networking site called Twitter. Huberman, Romero, and Wu (2008, p. 2-3) argue that Twitter is being used by millions of people around the world to stay connected to their friends, family members and coworkers through their computers and mobile phones. Gartner Company believes that popular impact of microblogging is leading companies to utilize it (Gartner highlights four ways in which enterprises are using twitter, n.d.). Zarella (2010, p.31) believes that most companies should be on Twitter because it is easy, requires very little time, and can quickly prove worthwhile in increased buzz, sales, and consumer insight.

For businesses, communicating using Twitter in this era is quite inevitable. The concept of "borderless countries," rise of cross-border competition, use of social networking/social media in daily activities, personal and many-to-many medium of communications are creating the need for corporations to have more and right media to communicate with their audience. Twitter allows this happen by facilitating communication between corporations and their audiences. Furthermore, businesses can easily tweet from several places using Twitter clients that are accessible via desktop, laptop, mobile phones, and tablets. Examples of these clients are Tweetdeck, Hootsuite, Echofon, etc.

Twitter and Indonesia

The right relationship between Indonesia and Twitter can be seen in a November 2010 CNN report titled "Indonesia: a Twitter Nation" (Sidner, 2010). In the article, Enda Nasution, a well-known Indonesian blogger, stated that the middle class in Indonesia "has found the place to say what they like, what they think, and what they feel, online." The article cited one case that portrayed the popularity of Twitter and social media in Indonesia. The case is called "A Coin for Prita" in which Indonesians voluntarily donated coins to help Prita Mulyasari. She was accused in a lawsuit after she complained to her friends about how she was misdiagnosed for her illness by a hospital in Indonesia. The outrage from social networkers in Indonesia generated 800 million Rupiah. In the end, Prita was proved not guilty and released. The popularity of Twitter was also visible in 2010, when Salim Segaf

Al-Jufrie, a minister, was spotted driving in a bus lane in Jakarta. Instantly, the picture posted on Twitter went viral, attracting thousands of comments. Many even called for his resignation (Why Indonesians are all a-Twitter, n.d.).

Indonesian capital Jakarta ranks number one in terms of posted tweets, while Indonesia ranks five (The World's Most Active City? You Won't Guess It, n.d.) in the world. Indonesia, according to Brand24, as posted in Tech in Asia, has 29 million Twitter accounts and Jakarta posted 2.4% of the 10.6 billion tweets worldwide. In the list of tweets, Jakarta is closely followed Tokyo and London (Indonesia is Social: 2.4% of World's Twitter Posts Come From Jakarta [Infographic], n.d.).

Some of the most popular brands have heavy following on Twitter: Ramalan Indonesia (@TweetRamalan) has more than 6 million, TV One News (@tvOneNews) 3 million and Kompas.com (@kompascom) close to 2.5 million followers (Top 100 Twitterholics based on Followers in Indonesia, n.d.).

Apple Brand and Indonesia

Apple is one company is this world, according to Interbrand (Interbrand-Apple, n.d.) that has been able to capture everyone's imagination. It inspired brand devotion and revolutionized the way people live. Apple won consecutive Harris Interactive Brand of the Year Awards in three categories – for MacBook, iPad, and iPhone – (Apple awarded 'Brand of the Year' for iPhone, iPad, and MacBook, n.d.) in 2012 and 2013. The global success of Apple is a result of six factors: those who created Apple products want to have them too; products are easy to use; great customer service and in-store experiences; products that Apple make work better than others; and stays at least two years ahead of its competitors (6 Reasons Apple Is So Successful, n.d.). Apple's success enabled the brand to achieve brand value of US$76,568 million – number two in the world behind only Coca Cola, according to Interbrand (Interbrand-Best Global Brand 2012, n.d.)

The success of Apple is also visible in Indonesia. Launching of iPhone 5 in Indonesia resulted in long queues. More than 2,000 iPhone 5 were sold during pre-order stages, while queues could be seen in Jakarta's malls such as Central Park and Senayan City, Seven Eleven Jakarta, and online vendors like Lazada, Rakuten, and Blibli (iPhone 5 Launches in Indonesia, Met With Queues and Contests, n.d.). Apple also confirmed that it will open an online store and an official retail Apple Store in Indonesia, investing US$2m to US$3m (Apple Indonesia Investment Confirmed, Jakarta Store and Online Sales Coming Soon, n.d.).

Research Subject: Apple, Twitter, and Indonesia

What is interesting to be researched upon is how Apple developed a large and intimate customer base by knowing exactly what and when to communicate through the social media, mainly via Twitter. This gap of knowledge that other

brands suffer from is what this research focuses on. With an aim is to fill up the gap, the researcher will answer the following fundamental questions: what should I, as brand/organization say to my audience? What kind of responses will I get? Should I have any knowledge about time that I can put in my messages?

The relationships between Twitter, Indonesians on Twitter, and Apple as a brand will be taken into account. Twitter as a medium has various elements such as mentions and retweets; Indonesians on Twitter will be seen by the responses to the messages posted by Apple; and Apple as a brand will be seen by what topics they communicate and when.

Also, Apple in Indonesia is currently represented by several Apple-authorized distributors-dealers and some unauthorized retailers. These unauthorized retailers are not the subjects of this research. The authorized distributors-dealers, just like any other company in Indonesia communicate using Twitter. These authorized distributors are: iBox, Infinite, EMAX, eStore, Click, Zoom, etc. Apple itself does not have any official Twitter account till date. However, the authorized distributors have.

These distributors use Twitter to communicate with Apple's audience, fans, and even Apple Evangelists. However, no specific status of audience has been taken into consideration in this research because it is impossible to determine who are fans or evangelists or just enthusiasts of the brand/products.

Therefore, the research will answer the following questions:

* What topics are communicated most by the researched brand's Twitter accounts?
* What topics generate the most retweets on the researched brand's Twitter accounts?
* When is the favorable time to communicate preferred topics in order to receive retweets?

The results should suggest how Apple should communicate, receive feedback, and whether time plays important role in communicating with the audience in Indonesia. The academic significance of the research how microblogging such as Twitter can be used by businesses to communicate, especially regarding content/topic. For practical use, tweeting topics, feedback management, and favorable times, especially in this case and in Indonesia, from this research can be one of reference value for developing brand communication in social media or even digital marketing practices.

Previous Research from Academic Journals

Pitta and Fowler (2005) stated that Internet community had been focusing on the conversation happening between consumers (C-C) or two-way communication rather than one-way communication. Early usage of Internet by businesses was limited to sending messages to many customers connected with the Internet. Now,

businesses use Internet to facilitate discussion and create many-to-many communication. In the form of microblogging, communication between customers and communication between business/organizations with customers and vice versa, also happened. Research by Java, Finin, Song, and Tseng (2007) on 1,348,543 posts from 76,177 users (mainly from North America, followed by Europe, Asia, Oceania, South America, Africa, and more than 38,000 from unknown regions) concluded that microblogging enabled users to communicate with each other, share information, report news, provide information, and find friends and information.

However, there are still questions regarding the influence of microblogging. Thus, to measure Twitter's influence, research from Cha, et al. (2010) titled "Measuring User Influence in Twitter: The Million Follower Fallacy" is taken into account. The research looked at 54,981,152 accounts and ignoring users with less than 10 tweets, researchers analyzed 6,189,636 users. Researchers measured the top Twitter users in their own fields, whether these top Twitter users had more retweets and mentions, their influence across topics, and how they maintain their influence. This research also found that by focusing on a single topic and increase in user influence scores will be significant.

Retweets are driven by the value of content of a tweet while mentions by the value of names of the users. This research highlights that the number of followers, topics, mentions, and retweets can be used to measure influence of Twitter users.

On Twitter, impact of messages from business/organization to customers and to the business/organization itself was researched by Jansen, et al. (2009). According to them, Twitter usage by business/organizations can lead to electronic Word of Mouth (eWOM). They asked questions on the overall eWOM trends related to 50 brands. Results showed that 60% sentiments were positive, 22% negative, and 12% neutral. Characteristics of brand microblogging language showed that brands used natural language sentences. For understanding patterns of microblogging communications between companies and customers, researchers took Starbucks tweets. Starbucks received positive comments (24.8%), negative comments (7.3%), responses (17.6%), questions (12.7%) and answer to questions (11.4%). Researchers believe that Starbucks Twitter account is a place for a combination of customer testimony, complain, feedback, and questions and answers. Again, this research proved that impact of messages can lead to various results just like what they did with 50 researched brands and Starbucks.

Theories

Computer Mediated Communication (CMC) is the foundation of this research. CMC, as Thurlow, Lengel, and Tomic (2004, p.16) believe "is more concerned with human interpersonal communication on, through, and about the Internet and web." They (p. 15) collected several definitions of CMC which Santoro (1995, p. 11) believes can encompass virtually all computer uses including applications, such as

statistical analysis programs, remote-sensing systems, and financial modeling programs. All of these fit within the concept of human communication. December (1997) believe that CMC is a process of communication using computers, used by people in particular contexts, in which the processes shape media for a variety of purposes. Herring (1996, p. 1) understands CMC as a communication that takes place between human via computers as instrument.

As this research focuses on the “spreading” issue, the theory of Word of Mouth Marketing (WOMM) is also being considered. WOMM, according to Vered (2007, p. 7-18 and 39), needs four aspects to facilitation. These are: Physical aspect: what can be given to people so that they can distribute to their friends (business cards, videos, books, etc); Story aspect: something unique and conversation-worthy about the business; Motivation aspect: what are the drivers for the other person to start the conversation; Viral aspect: how easy it is for people to move messages to other people. For this study, the viral aspect, especially for understanding topics that are both news and conversation worthy is highlighted.

The research also supports the theory of Consumer Buying Decision. The ‘buying’ in this case is about followers “buying” messages by communicating these messages to other people via Twitter. The consumer decision process consists of five stages (Naik and Reddy, 1999, p. 19): problem recognition, internal search and alternative evaluation, external search and alternative evaluation, the purchasing process, and the decision outcomes. Problem recognition will lead to recognition of a need, which means that the buyer perceives a gap between the actual and desired states (Lee and Johnson, 2005, p. 111). In the case, Twitter users, particularly those who are interested in knowing various, abundant, and fast information regarding Apple’s products or followed brands, might face the problem of need of information and/or conversation with Apple or the researched brands. Internal search is the process in which a consumer searches his or her memory to find satisfactory solution to the problem (Lantos, 2011, p. 68). If internal research fails to come up with an acceptable option, then the person will go for external search (Lantos, 2011, p. 68). Furthermore, in searching from external parties, people make decision based on the degree of search (time and effort needed to search), and direction of search (which sources of information to use). For this study, Twitter is taken as the search engine for and from various information: news, information, quotes, story, friends’ previous tweets, etc. After considering possible options, one will make purchase decision, about whether to buy or not (Lee and Johnson, 2005, p. 112).

As this research focuses on Twitter too, the theory of the medium also placed. Twitter, according to Zarella (2010, p.31), is a microblogging because it limits the size of each post. Elements in Twitter including avatar: picture used by users; bio: profile page that explain who the Twitter users are; background: image on the background for Twitter users; and following and followers: number of people followed by account and numbers of accounts followed by other people (Zarella, 2010, p.35, 37, 39).

Methods

Content analysis was done to find research questions. Content analysis, according to Zito (1995), quoted by Berger (2011, p.174), is a method by which the researcher seeks to determine the manifested content of written, spoken, or published communication by systematic, objective, and quantitative analysis. It is then, a quantitative method applicable to what has traditionally been called qualitative material-written language.

This study used non-probability sampling. Zikmund and Babin (2007, p. 411) explain that in non-probability sampling the probability of any particular member of the population being chosen is unknown and best suited for a specific purpose. The type of nonprobability sampling used in this research is purposive sampling. This is because certain criteria need to be fulfilled by the samples, which are: must be official distributors of Apple's products; must operate in more than one city: this is to accommodate wider audience profile; must have official Twitter accounts, existing for at least one year (April 2011 latest); must have at least 500 tweets from date of joining; must have at least 500 followers from the date of joining. Only four distributors/retailers of Apple in Indonesia fulfill these criteria: iBox, Infinite, EMAX, and eStore.

Data generated through online search including Twitter web search, Hootsuite search (for date joined, since it cannot be done via Twitter web search), Facebook search (to verify whether Twitter accounts of researched brands are real: indicated by mentioning the Twitter account in their Facebook accounts), and website search (another validation method to ensure whether the account is real or not). For retweets, the researcher used retweetrank.com since Twitter's website does not have the arrangement to show retweets from the followers of a brand.

Data analysis was done by first organizing the data, which are tweets and retweets of researched brands classified into certain topics. Second step was coding and categorizing the messages, example: "iPod Touch discount Rp 200.000 only at iBox" was considered a promotional topic. Double checking of the message and its meaning was also done. The third step was that in which the researcher was able to see which topic attracted the highest retweets by followers of the researched brands. The researcher was also able to generate ideas about whether one or several topics were preferred by followers of the researched brands. Last step was collecting data on the time of the retweets. The researcher analyzed the time of retweets using retweetrank, a web-based online software that can display data of retweets and its time (seeing these on Twitter website is not possible).

The research was initiated in March 2012. In the beginning, the researcher brainstormed and conceived the concept of the research. In the next stage, the researcher analyzed the researched brands, topics, retweets, and favorable time to communicate the preferred topics throughout the month of June 2012.

Results and Discussions

Before analyzing topics, retweets, and hour of retweets, the first step was collecting data regarding Twitter accounts of researched brands. This was done to ensure that the researched brands were indeed in line with set criteria. The detailed data regarding Twitter accounts of the researched brands are:

@iBoxIndonesia: 12762 tweets, 26357 followers, 77 following, joined 16 April 2009.

@InfiniteAPR_id: 3176 tweets, 2559 followers, 200 following, joined 19 Sept 2011.

@EMAX_World: 728 tweets, 1767 followers, 1844 following, joined 16 Nov 2009.

@eStore_id: 2668 tweets, 1329 followers, 103 following, joined 26 August 2009.

Based on the data, iBox clearly bettered the rest of the accounts with more than 10,000 tweets, 25,000 followers, the least number of followings, and joining Twitter before the others. The three other brands are in tight competition in terms of the number of tweets, followers and following. This indicates that Infinite may be more popular than EMAX and eStore. Infinite too, despite only less than one year of existence on Twitter (this piece was written in the first quarter of 2012), has the highest number of tweets, which indicates that their participation is higher than EMAX and eStore.

EMAX has the least number of tweets, despite joining on 16 November 2009. The data presents the fact that the density of tweets by EMAX is significantly lower compared to the other three brands. Interestingly, EMAX has the highest following, accounting for more than ten times the other three brands. eStore's case is similar to Infinite. Both have more than two and a half thousand and less than three thousand tweets. However, Infinite has nearly one thousand more followers. The fact that eStore has significantly less number of outlets could be the reason.

Tweets of the researched brands were categorized topic-wise. Tweets by the researched brands from March 2012 to May 2012 were observed and categorized as follows:

Greetings

Greetings are acknowledgements for certain conditions or events. Greetings sent by brands can be in the form of salutation regarding a new day or closing a day. Example of tweets (in Bahasa Indonesia): "Selamat pagi", "Selamat malam", or "good morning", "good night", etc; Salutation regarding national day, such as Indonesia's Independence Day, Indonesia Education Day, New Year, etc; Salutation regarding religion celebration day like Christmas, Idul Fitri, Vesak, etc.

Apple Information

Apple-related Tweets provide news, opinions, rumors, and product reviews. Since all the researched brands sell Apple products, various tweets are dedicated to show each brand's competence and excitement in communicating this brand. As a brand, Apple's information can be on products, operating system (iOS), software,

third-party applications, games, hardware, and key personnel of Apple and their stories, quotes, news, etc. Examples of informative tweets on Apple: “New Macbook arrive soon. Be prepared” or “Angry Birds Space is now out. Grab it fast.”

Brand Information

Brand information is knowledge provided by the researched brands regarding their communication activities (events, new store opening, new service center opening, new post on Facebook or other social networks, etc.). However, brand information excludes promotional activities like discounts, quizzes, and vouchers. Example of tweets regarding brand information: “iBox new service center now open in Summarecon Mall Serpong” or “EMAX now hiring: social media executives.”

Promotion

Promotional activities communicated by brands include discounts on any item they sell (including non-Apple products: speakers, accessories, etc.), quizzes, vouchers or free gifts. Examples of tweets regarding promotion: “Free voucher Rp 200.000 for those who can answer previous question posted” or “Maroon 5 concert tickets for lucky five.”

Conversation

Conversation is two-way communication that happen between brands and its followers. This research counted retweets as conversation that happen between brands and followers.

Calculation of tweeted and retweeted (RT) topics, and hour of retweets collected using a simple form created by the researcher. The calculation was done manually from Twitter at the end of the day, around 2300-2359 hours for 30 days, from 1-30 June 2012. The researcher examined the topics based on the sentences used. For example, sentences that used the word: Apple, iPad, iPod, MacBook Pro, MacBook Air, iOS were considered information on Apple. However, if the word MacBook Pro is being added with brand related words, example: “MacBook Pro Retina Display available now at iBox,” then it was considered brand information. The form used.

The researcher categorize the hours of RT for eight periods of time. The categorization is based on activities of target audience of Apple who in various articles, are stated to be students, professionals, entrepreneurs, etc. – mostly young and with considerable income from jobs or family sources (Apple iPhone Marketing Plan, n.d., Target Audience for Mac or Apple Computers, n.d., Teen Marketing: Apple’s the Master, n.d.). The eight periods are:

00.00-05.59 weekday: when most people are sleeping.

Weekend: same as weekday.

06.00-08.59. weekday: waking up to go to school or workplace.

Weekend: waking up, watching TV, browsing Internet, or sleeping.

09.00-11.59. weekday: school or work.

Table 1: Topics Tweeted by Researched Brands' Form

No	Brand	Twitter Account	Topics Tweeted				
			Greetings	Apple Information	Brand Information	Promotion	Conversation
1	iBox	iBoxIndonesia					
TOTAL							
2	Infinite	InfiniteAPR_id					
TOTAL							
3	EMAX	EMAX_World					
TOTAL							
4	eStore	estore_id					
TOTAL							

Source: prepared by researcher

Table 2: Retweeted Topics of Researched Brands' Example

No	Brand	Twitter Account	Topics Retweeted				
			Greetings	Apple Information	Brand Information	Promotion	Conversation
1	iBox	iBoxIndonesia					
TOTAL							
2	Infinite	InfiniteAPR_id					
TOTAL							
3	EMAX	EMAX_World					
TOTAL							
4	eStore	estore_id					
TOTAL							

Source: prepared by researcher

Weekend: watching TV, browsing Internet, breakfast, brunch.

12.00-14.59. weekday: break time, start of class or work after lunch. Weekend: hang out in various places (malls, parks, etc.), watching TV, lunch, family trip.

15.00-16.59. weekday: school or work.

Weekend: hanging out in various places (malls, parks, etc.), watching TV, lunch, family trip.

17.00-19.59. weekday: at home doing homework, taking extra classes, travelling back home from office, dinner.

Weekend: hanging out in various places (malls, parks, etc.), watching TV, dinner, family trip.

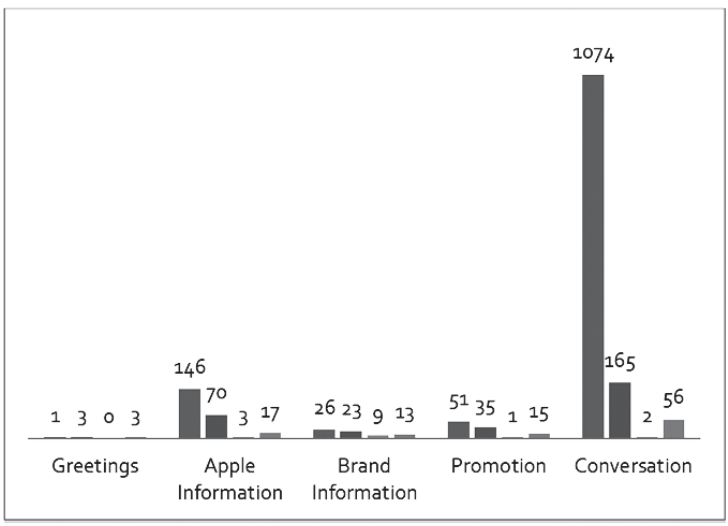
20.00-21.59. weekday: watching TV, browsing Internet, dinner. Weekend: watching TV, browsing Internet, dinner.

The topics, retweeted topics (RT), and the hour of retweets were calculated from 1-30 June 2012, every day from 00.00 to 23.59. For a better view, color coding has been done. iBox represented by Blue, Infinite Red, EMAX green and eStore orange.

Table 3: Hourly Retweet Topics of Researched Brands' Example

No	Date	Retweeted Topics	Twitter Accounts																					
			iBoxIndonesia							infiniteAPR_id							EMAX_World							
			00.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-16.59	17.00-19.59	20.00-21.59	22.00-23.59	00.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-16.59	17.00-19.59	20.00-21.59	22.00-23.59	00.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-16.59	17.00-19.59	20.00-21.59	22.00-23.59
1	1 June 2012	Greetings																						
		Apple Information																						
		Brand Information																						
		Promotion																						
		Conversation																						
2	2 June 2012	Greetings																						
		Apple Information																						
		Brand Information																						
		Promotion																						
		Conversation																						
3	3 June 2012	Greetings																						
		Apple Information																						
		Brand Information																						
		Promotion																						
		Conversation																						
4	4 June 2012	Greetings																						
		Apple Information																						
		Brand Information																						
		Promotion																						
		Conversation																						
5	5 June 2012	Greetings																						
		Apple Information																						
		Brand Information																						
		Promotion																						
		Conversation																						

Source: prepared by researcher



Graph 1: Total Tweeted Topics-All Researched Brands: 1-30 June 2012

Source: prepared by researcher

Details

Greetings

All brands hardly tweeted for a whole month with greetings. The highest were three tweets each by Infinite and eStore.

Apple Information

iBox has a significantly higher amount of tweets regarding Apple information compared with other brands.

Brand Information

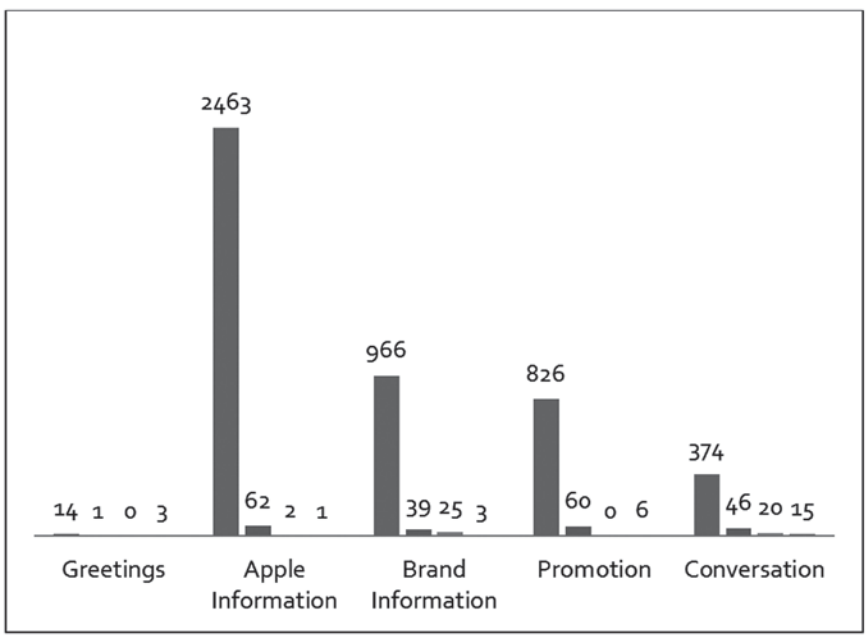
Tweets distribution on this topic is more or less uniform for all the brands. None dominates or even looks like trying to communicate more on this topic.

Promotion

iBox and Infinite have quite a lot of promotion-based tweets. eStore looks like trying to compete, however, not yet close to the two former; while for EMAX, only one tweet happened, indicating that the brand was still not actively participating in the "tweet war."

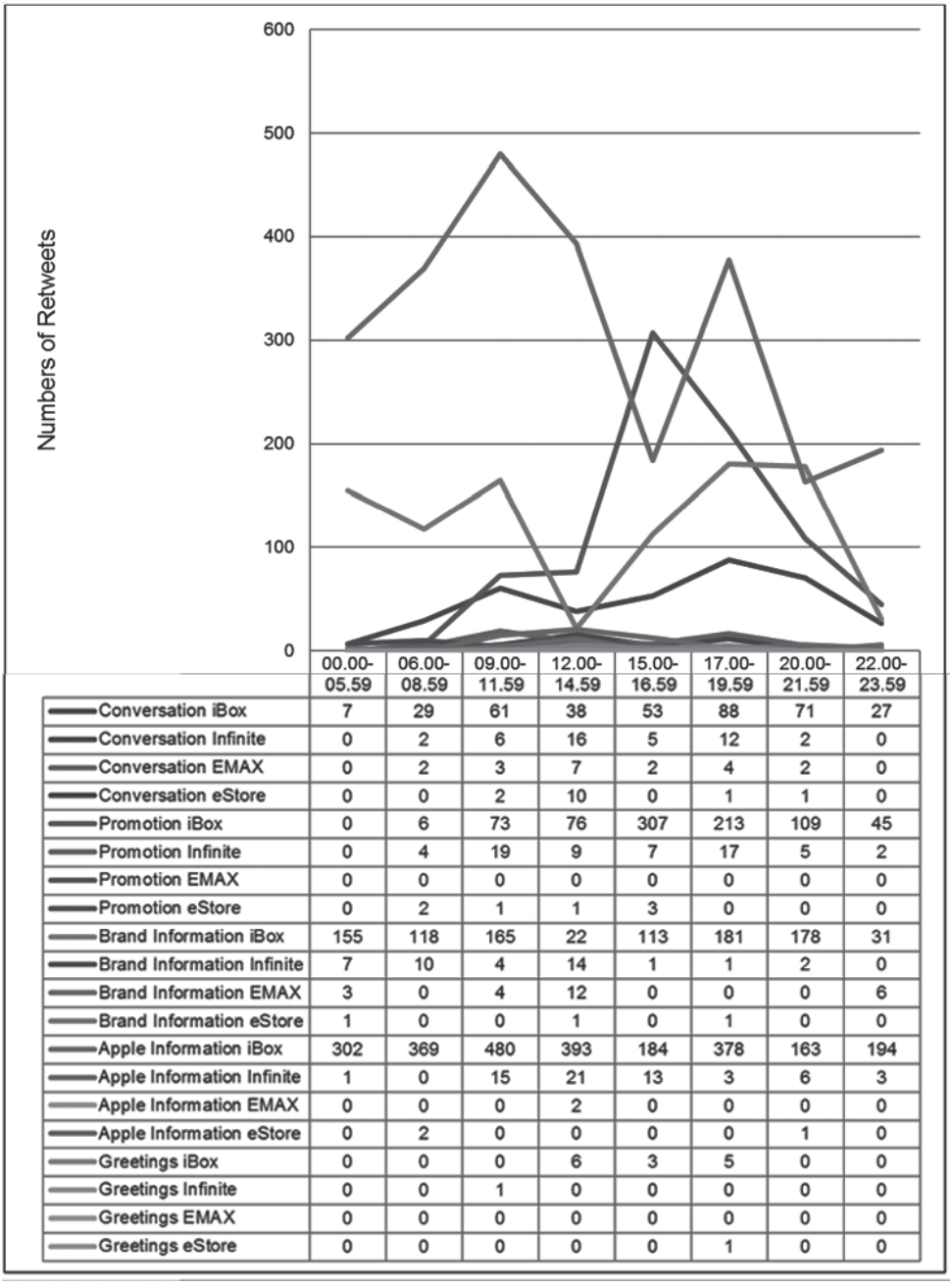
Conversation

iBox is the most dominant brand when it comes down to conversation, with almost all of its total tweets focusing on this. Infinite and eStore are not far behind either, while for EMAX, this is only the third most tweeted topic, with only two tweets for the whole month.



Graph 2: Total Retweeted Topics-All Researched Brands: 1-30 June 2012

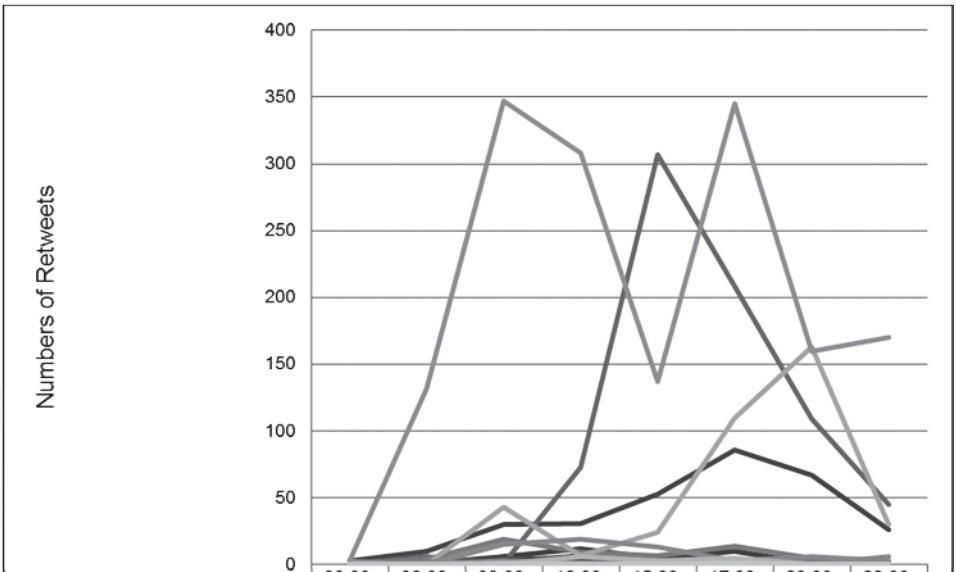
Source: prepared by researcher



	00.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-16.59	17.00-19.59	20.00-21.59	22.00-23.59
Conversation iBox	7	29	61	38	53	88	71	27
Conversation Infinite	0	2	6	16	5	12	2	0
Conversation EMAX	0	2	3	7	2	4	2	0
Conversation eStore	0	0	2	10	0	1	1	0
Promotion iBox	0	6	73	76	307	213	109	45
Promotion Infinite	0	4	19	9	7	17	5	2
Promotion EMAX	0	0	0	0	0	0	0	0
Promotion eStore	0	2	1	1	3	0	0	0
Brand Information iBox	155	118	165	22	113	181	178	31
Brand Information Infinite	7	10	4	14	1	1	2	0
Brand Information EMAX	3	0	4	12	0	0	0	6
Brand Information eStore	1	0	0	1	0	1	0	0
Apple Information iBox	302	369	480	393	184	378	163	194
Apple Information Infinite	1	0	15	21	13	3	6	3
Apple Information EMAX	0	0	0	2	0	0	0	0
Apple Information eStore	0	2	0	0	0	0	1	0
Greetings iBox	0	0	0	6	3	5	0	0
Greetings Infinite	0	0	1	0	0	0	0	0
Greetings EMAX	0	0	0	0	0	0	0	0
Greetings eStore	0	0	0	0	0	1	0	0

Graph 3: All Brands Hourly Retweeted Topics: 1-30 June 2012

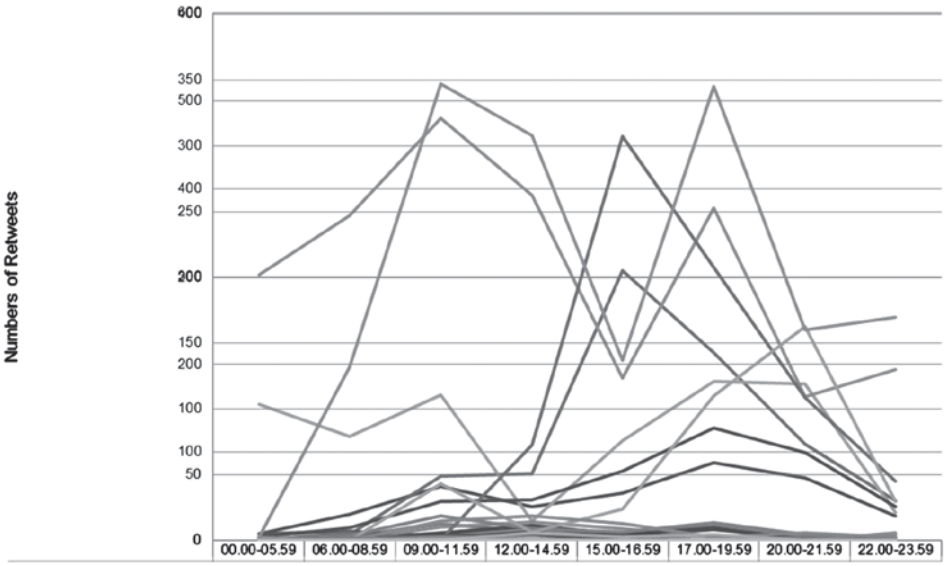
Source: prepared by researcher



	00.00-05.59	06.00-08.59	09.00-11.59	12.00-14.59	15.00-16.59	17.00-19.59	20.00-21.59	22.00-23.59
Conversation iBox	3	10	30	31	53	86	67	26
Conversation Infinite	0	1	6	12	5	10	1	0
Conversation EMAX	0	0	3	5	2	1	2	0
Conversation eStore	0	0	2	7	0	1	1	0
Promotion iBox	0	6	1	73	307	208	109	45
Promotion Infinite	0	4	19	9	7	14	5	2
Promotion EMAX	0	0	0	0	0	0	0	0
Promotion eStore	0	2	1	1	3	0	0	0
Brand Information iBox	2	0	43	7	24	110	163	30
Brand Information Infinite	0	0	4	5	1	1	0	0
Brand Information EMAX	1	0	3	1	0	0	0	6
Brand Information eStore	0	0	0	1	0	1	0	0
Apple Information iBox	3	132	347	308	137	345	160	170
Apple Information Infinite	1	0	15	19	13	3	6	3
Apple Information EMAX	0	0	0	0	0	0	0	0
Apple Information eStore	0	2	0	0	0	0	1	0
Greetings iBox	0	0	0	6	3	5	0	0
Greetings Infinite	0	0	1	0	0	0	0	0
Greetings EMAX	0	0	0	0	0	0	0	0
Greetings eStore	0	0	0	0	0	1	0	0

Graph 4: All Brands Hourly Retweeted Topics: 1-30 June 2012 except for 12 and 29 June, 2012

Source: prepared by researcher



Graph 5 shows that the dates 12 and 29 June were not counted because the

Source: prepared by researcher

Each RTs in Detail

Greetings

Very small number of RTs received in all researched brands regarding this topic. This might also have happened because small amounts of tweets sent on this account.

Apple Information

ibox received the highest number of RTs, far beyond the other brands on this topic. Infinite has the highest amount of RTs received on this topic as well.

Brand Information

Again, iBox dominates the chart with more than 900 RTs on this topic. EMAX comes second.

Promotion

iBox still the highest, while EMAX and eStore currently struggle to receive RTs on this topic.

Conversation

While iBox still dominant, three other brands received considerable amount of RTs. For eStore, this topic generated most RTs, even though the numbers are small in comparison with the rest.

From the research results, it is evident that the topics communicated were clearly dominated by conversation, followed by Apple information and promotion. However, based on RTs, it is interesting to see that retweets on Apple information

were almost twice the other topics. By hour, it can be seen that the pattern is very similar. There is also an exception in terms the 00.00-05.59 time frame, in which apart from 12 and 29 June, 2012, the time frame was close to zero RTs.

From this result, it is very clear that brands need to enhance their communication for topics such as Apple information. However, it does not necessarily mean that conversation needs to be eliminated. The implication of dropping conversation, which is mainly through mentions, can create disturbance in the whole communication process which, however, is not part of this study.

Based on RTs, since customers are clearly focusing on Apple information, it is quite possible that most of the followers of the brand are Apple evangelists, or at least enthusiasts. This also means that any news coming from Apple will surely trigger word of mouth and affecting the communication of these brands. Promotion, as the second highest topic communicated, was not even half as popular as Apple information.

In case of timing of RTs, there is no indication that certain hours contributed better than others. The pattern is scattered all over, only clearly showing that from 00.00-05.59 (when people usually sleep), almost zero RTs were received. Thus, it can be said that based on the timing factor, no pattern can be determined from which it can be concluded that certain times are best for tweeting.

research considered them special. On both the days, Apple launched new products: MacBook Pro Retina Display on 12 June, and new iPad in Indonesia on 29 June. When compared, the pattern of communication, with or without 12 and 29 June 2012, is very similar. There was no indication that because of these two dates, retweets and the timings of retweets changed significantly. Only when the products were launched that is from 00.00-05.59, the number of retweets spiked. However, this spike could be attributed to the excitement associated with the launching of a new product.

Based on these facts, it can be concluded that there are other factors that contribute to word of mouth, specifically for Apple in Indonesia. Other than the obvious Apple information, brand value of the distributor, novelty and value of tweeted information are the major factors. The researcher determined these factors based on the fact that iBox received significantly higher RTs in comparison to other brands. It means that the brand value of iBox is higher than any other brands, when awareness, association, or brand loyalty is taken into consideration. These are the components of brand equity according to Aaker and McLoughlin (2010, p. 176). However, these factors need to be researched further.

The second factor that the researcher highlighted was the novelty and value of the information provided. As has happened on 12 and 29 June 2012, launching of Apple’s new product worldwide and also in Indonesia caused high RTs for all the brands. When the researcher deleted the data on these two dates, significant amount of RTs were missing from the researched brands. This thus proves that novelty of information is indeed one of the factors that contribute to high RTs. Novelty of information can be related to any topic. On 12 June 2012, most of the

information was on Apple because of the launching of MacBook Pro Retina Display worldwide. The event triggered a lot of RTs; for example, IBox received around 300 RTs on that date. The same pattern was visible on 29 June 2012. However on this date, all the brands tweeted brand information since new iPad/iPad 3rd generation could already be bought in Indonesia. The two topics received significant amount of RTs, regardless of what topic the information was on. This thus proves that newness of information is one of the factors that has no relation with the topic, but can still generate high RTs.

Yet, the newness factor alone is not enough. Both dates had one other element that contributed to high RTs - the value of the information. Launching of MacBook Pro Retina Display worldwide and new iPad in Indonesia are considered to have high informational value to the followers of the researched brands. New information will hardly generate high RTs if the information is not considered valuable. For example, new information regarding opening of a new store of Infinite in Senayan City in Jakarta, will not be as attractive as a the availability of a new iPad. Another example is the launching of an online shop of EMAX. This will not to be compared with the launching of MacBook Pro Retina Display. Thus, value of information is crucial. Whether the information is valuable or not is for the followers to decide. What elements contribute to creating valuable information also need further research. Another consideration is that value alone is not enough since information like the availability of iOS 5 in July 2012 will hardly create high RTs because the iOS 5 had already been launched months before. The information can be considered valuable since it is a system upgrade, although not new anymore.

In the end, the combination of newness and the value of information must be considered in pairs. Based on the research, new information need to be tweeted alright, but the decision on the value is still questionable. Public reactions will indicate whether the information is valuable or not.

As a global company, Apple and its distributors obviously need to communicate information as retweets. Distributors also need to associate the brand as closely as possible to Apple (value of the distributor's brand). This is necessary because many followers of these brands are either Apple evangelists or at least enthusiasts. Also, newness and value of tweeted information need to be considered. On the other hand, quickness (or even real time) and correctness (or rumours) of information can be the deciding factors for Apple brand communication to be develop in Indonesia, mainly via Twitter.

In the end, this study can contribute to creating better understanding on topics communicated on Twitter. Holistic findings and analysis on this study will be beneficial for both academicians and practitioners. On a larger scale, this research can help the understanding of word of mouth in social media, especially on Twitter.

Conclusion

From the comprehensive understanding and explanations in this study, conclusions for topics being communicated the most by researched brands are as follows:

iBox - conversation;

Infinite - conversation;

EMAX - brand information;

eStore -conversation.

Considering all the brands, the highest tweeted topic is conversation. For topics being retweeted, the most that came from the followers of the researched brands are as follows:

iBox - Apple information;

Infinite - Apple information and promotion;

EMAX - brand information and conversation;

eStore - promotion and conversation.

Thus, considering all the brands, Apple information is the most retweeted topic.

In terms of the favorable times for receiving RTs:

iBox - Apple information from 09.00-11.59;

Infinite - Apple information from 12.00-14.59 and promotion from 09.00-11.59;

EMAX - brand information from 12.00-14.59 and conversation from 12.00-14.59;

eStore - conversation from 12.00-14.59.

However, when all the brands are considered, no pattern emerged. There are other factors at work - brand equity and newness and value of information. Brand equity in the form of awareness, association, and loyalty need to be researched further, as in which brands have higher equity. From this study, it is evident though that iBox clearly has the higher brand value. Newness of information does not depend on topics, while value of information rests with the followers.

For these distributor brands, there is no need to create a new brand identity or try to differentiate themselves with Apple as a brand. The closer the brands are with Apple, the easier it is for them to create eWOM and any other positive impact, possibly through communication via Twitter.

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Factors Influencing the Adoption and Use of ICT by Small and Medium Sized Enterprises in Tanzania: A Case Study of Kilosa District

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Abstract

The key purpose of this study was to assess the socio-economic impact of low adoption of ICT on SMEs in Kilosa District. The study had four specific objectives: determination of ICT adoption rate in comparison with the general number of SMEs; assessment of the challenges of ICT adoption in SMEs; assessment of the awareness of the SME operators and owners on the importance of ICT adoption in their businesses; and assessment of the accessibility of ICT tools in areas of business operations among the SMEs.

This study was conducted at Kilosa District in Morogoro region. Data were collected primarily in the field area while the secondary ones were from the Internet. On the other hand, structured questionnaires were used to interview the key respondents.

The study also used both probability and non-probability sampling techniques to obtain the sample size of 60 respondents. Nonetheless, this study used cross sectional research design/method in data collection. The collected data were coded and analyzed using SPSS (Statistical Package for the Social Sciences).

The study identified some factors that cause low adoption of ICT in SMEs in Kilosa District including knowledge needed for using ICT tools, low level of ICT base in the SMEs sector, technical problems of some ICT tools, high adoption costs and low emphasis of ICT usage (adoption) from both Governmental and non-governmental institutions.

On the other hand, there are some suggestions from the study on the possible measures to deal with the challenges of low adoption of ICT on SMEs which include expansion of ICT infrastructures, provision of basic knowledge of ICT in the SMEs sector, reduction of tariffs on the import of ICT products and promotion of locally based ICT innovators and clients of SMEs.

Keywords

Information and Communications Technology (ICT), small and medium sized enterprises (SMEs), ICT adoption, ICT use, ICT policy

1.1 Background

The impact of ICT in Africa, both in terms of ICT development (increased infrastructure and access) and ICT for development (adoption of ICT applications), is said to have advanced the development process itself through the delivery of services such as education, health, better governance, enterprise, and business development, as well as their overall contribution to socio-economic wellbeing (especially poverty reduction), political stability, and self-actualization (Okpaku, 2006).

Generally ICT is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning (Rouse, 2005).

The SMEs nomenclature is used to mean micro, small and medium enterprises. It is sometimes referred to as micro, small and medium enterprises (MSMEs). The SMEs cover non-farm economic activities, mainly manufacturing, mining, commerce and services.

There is no universally accepted definition of SME. Different countries use various measures of size depending on their level of development. The commonly used yardsticks are total number of employees, total investment and turnover.

In the context of Tanzania, micro enterprises are those engaging up to four people, in most cases family members, or employing capital up to 5.0 million Tanzania shilling (SME Development Policy, 2002).

Africa faces a digital divide in the socio-economic development because of unequal pattern of material access, usage capabilities, benefits and participation concerning ICT because of asymmetric distribution of economic- and socio-capital (Fuchs and Horak, 2008). Mokaya and Njuguna (2012) observed that failure to adopt ICT has led to high costs of production and hence low profits among the SMEs in Kenya.

On the other hand, Ashrafi and Murtaza (2008) reported that SMEs had been slow in adopting ICT for various reasons such as limited financial and human resources needed to adopt it.

However, lack of knowledge about potential benefits of ICT among SME owners is said to be another factor for low or poor adoption of ICT in SMEs (Martin 2005). Some literature insists on the lack of necessary ICT base among the SME owners to be among the factors leading to low adoption of ICT in SMEs (Mutula and Van Brakel, 2007). Mutula and Van Brakel (2007) argue that ICT adoption among SMEs depend on the owners' ICT skills, personality and attitude towards technology.

A study by MacGregor and Vrazalic (2006) revealed that technology was constantly evolving, getting faster, smaller, more powerful, cheaper or digital. As the ICT environment is ever changing, constant learning and updating of technology is needed.

Jackson (2007) and Herselman (2003) argue that sometimes it is difficult to adopt ICT because of high installation costs as most of the SMEs do not have budgets for these.

Despite the challenges facing SMEs in adopting ICT in its daily operations, the field has succeeded to improve the economic status of various countries as it contributes between 25 to 35 percent of the world's manufactured export (Verma, 2005).

According to Barnes et al (n.d), small and medium sized enterprises are an important part of the European Economies as 99.9% of the UK's 4.3 million business enterprise are SMEs. In the African countries, ICT produced 0.59% increase in the per capita Gross Domestic Products after 10% increase in the availability of mobile phones (Waverman, Mesci, & Fuss, 2005).

However, there is a need for more studies on the adoption, usage and impact of mobile phones within SMEs in Tanzania. Kanire (2012) argues that the use of ICT can help social networking connections and establish potential links to access market updates. Likewise, Bugeja (2005) argued that there was still a need to explore how their adoption and usage were improving economic development and the extent to which mobile phones usage was practiced within SMEs.

The contributions of SMEs to employment and the country's gross domestic product (GDP) are by no means trivial. As of July 2006, close to 140 million SMEs in 130 countries employed 65 percent of the total labour force (UNDP, 2007).

According to Fripp (2012), Tanzania had 3,150 fixed broadband connections in 2010 that is, one connection for every 0.001 people in a country where 5.9 million people have access to the Internet.

A study by Melchioly and Sæbø (2010) noted that the SME entrepreneurs in Morogoro are using the opportunities provided by mobile phones to practice their businesses.

On the other hand, Sife et al (2010) found that mobile phones help to improve ways of doing rural businesses as 72.6% of traders could confirm goods and prices with different shops.

1.2 Problem Statement

A study by Salah and Irwin (2010) shows that SMEs need to acquire and utilize Internet related technologies such as those used for e-commerce in order to continue their efforts and remain competitive in this era of digital economy.

The application of ICT in enhancing human development, particularly in SMEs, is widely influenced by several development initiatives such as the Millennium Development Goals (MDGs) in which goal number 8 focuses on developing a global partnership for development by insisting on cooperation with the private sectors to ensure availability of new technologies especially information and communication technologies. Information, knowledge and technology are increasingly becoming the key drivers for socio-economic development worldwide (Dzidonu, 2010).

According to a report published by the Ministry of Finance and the Planning Commission of the President's office in 2012, the actual GDP generated from the communications industry in 2010 reached 22.1% of the total GDP of Tanzania and it was projected to reach 22.8% in 2013.

On the other hand, the Government of Tanzania, through the Ministry of Communication, Science and Technology, signed a collaboration agreement in July 2012 with IBM, the leading global ICT firm. The output from the agreement will help accelerate the adoption of technology in Tanzania and help the government to achieve its vision of becoming a hub for trade in the wider East Africa region. This is headed towards enhancing a sustainable economic development as outlined in the Tanzania National ICT Policy.

Also, indicator number 1 of the National Strategy for Growth and Poverty Reduction (NSGPR) Phase 1 insists on promoting sustainable and broad-based growth (MKUKUTA Phase 1, 2005). It also gives strategies set by the government to enhance human development through improvement of participation of the informal sector and SMEs.

Despite the efforts by the government, the ICT industry is faced with a number of challenges such that most of the ICT firms are focusing on urban centers whereas 80% of the population lives in the rural areas. Also, the country needs to move from being mere consumers of the technology to the processes of being designers and manufacturers of ICT. This requires Government support (National ICT Policy, 2003).

According to the National SME Policy 2002, the sector has limited access to technological development partly because they lack relevant information. It is argued in the policy that lack of technology adoption in the SMEs is due to the weaknesses in the industrial institutions in operating in isolation without focusing on the actual requirements of the sector. Furthermore, the available technologies are not disseminated to the potential clients.

Generally, Tanzania's ICT industry needs to be encouraged through experimentation and research, with the support of monitoring, venture capital and

fiscal incentives as small-scale startups and artisan enterprises are an essential component of a vibrant ICT sector (National ICT Policy, 2003).

1.3 Justification of the Research

According to the Tanzania Country Paper submitted to the 2nd World Summit on the Information Society Preparatory Committee (WSIS) in 2003, the United Republic of Tanzania recognizes national, regional and global efforts being made towards promoting socio-economic growth. The report suggested that transformation of the society into a communication society is the driving force behind high and easy adoption of ICT. However, the efforts by the government of Tanzania to increase and facilitate adoption of ICT in various development sectors particularly in SMEs is noticeable but still there is a gap in knowledge about adoption of ICT in SMEs (Sife et al., 2010). There is a lack of complementation between the two policies (i.e. National SME policy and ICT policy) as well.

The ICT policy itself looks on its own challenges facing the sector based on its policy objectives without analyzing the contributions of SMEs or micro-enterprises in the overall society wellbeing, especially in poverty reduction. Based on the potentiality of ICT in micros, the findings expected from this study will help the government and other stakeholders in the fields of ICT and SME in improving the efforts in the process of adoption of ICT in SMEs.

The study will also provide some empirical facts limiting the process of adoption of ICT in the Tanzanian SMEs, particularly in Kilosa district. Thus the objective of the study was to assess the socio-economic impact of low adoption of ICT among the SMEs in Kilosa District. The objectives were divided into four specific ones:

* To determine the ICT adoption rate by SMEs.
* To determine the challenges facing SMEs in the process of adoption of ICT.
* To assess the awareness of SME owners on the importance of ICT in their business operations.
* To assess the accessibility of ICT tools in areas of business operations among the SMEs.

2.0 Literature Review

2.1 An Overview of Information and Communication Technologies Adoption in Tanzania

The potential impact of ICT on an enterprise's efficiency and productivity explains why the utilization of technology presumably has strong links to the enterprise's competitiveness. This is applicable to different levels, improvement of internal business procedures, lowering of transaction costs, and a better understanding of

the operating environment with regards to both demand and supply. Even beyond such traditional approaches, new business opportunities seem to appear, like the formation of new business-platforms, creation of information-sharing and networking facilities, and prospects of cluster-building in emerging market segments (Nielinger, 2003). Kilangi (2006) says the development and support for the SMEs have been given special priority in the government programs. In recent years, the government has intervened a lot in the SMEs business activities and there is an increasing number of SMEs countrywide.

Based on the importance of ICT adoption for the success of their businesses, various governments and donor agencies have embarked on efforts to boost SMEs growth and performances by providing both infrastructure and resources necessary for ICT adoption and usage. For example, in 2007 the president of Tanzania pledged that the Government had desired to ensure that SMEs reap maximum possible benefits from a special nationwide fund amounting to 31 billion Tanzanian Shillings (Kilangi, ibid). In 2007, the National Bank of Commerce (NBC) set aside USD 100,000 to facilitate training programs for SMEs (Lema, 2007). These show that there is an enabling environment for the growth of SMEs.

2.2 An Overview of Small and Medium Sized Enterprise in Tanzania

According to the policy statement of the national SME policy, the Government of Tanzania will enhance acquisition and adaptation of technologies as well as enhancing networking between research and design institutions and SMEs as a way of upgrading technologies in order to increase productivity and competitiveness in the sector (National SME Policy, 2003). Thus the set policy plays a great role in accelerating the achievement of SMEs which depend on their nature of being easily adopted to market conditions in relation to broadly skilled workforce in different technologies (Abor and Quartey (2010).

2.2.1 Definition of Terms

2.2.2 Information and Communication Technology (ICT)

According to Chowdhury (2000), ICT is an abbreviation referring to technologies that can process different kinds of information (voice, video, audio, text and data) and facilitate different forms of communications among human agents, humans and information systems.

2.2.3 Small and Medium Sized Enterprise (SMEs)

The Tanzania Chamber of Commerce Industry and Agriculture (TCCIA) (2013) defines small enterprise as the most formalized undertakings engaging between 5 and 49 employees or with capital investment from 5 Million to 200 Million Tanzania shilling. The medium enterprise employs between 50 and 99 people and/or use capital investment from 200 million to 800 million Tanzania shilling. On the other hand, SMEs can be classified as follows:

Table1: Classification of Small, Medium and Large Enterprises

Enterprise/ Specification	Small Enterprise	Medium Enterprise	Large Enterprise
Number of Employees	50 or less	250 or less	More than 250
Annual Turnover ($ million)	4.50 or less	17.90 or less	More than 11.2
Balance Sheet Asset ($ million)	2.20 or less	8.95 or less	More than 5.6

Source: Business Statistic Organization (2002)

2.2.4 Adoption

The word adoption is used as a transitive verb to mean, to vote to accept, to take and follow (a course of action), to take up and make one's own. It is also used to refer to take on or assume. In this context, adoption will be used conceptually to mean the act or decision made by someone in using ICT.

2.2.5 How does Adoption of ICT Facilitate Development of SME Sector in Tanzania

Unlike the large enterprises, SMEs are not fully exploiting the potential of ICT. This is partly due to the fact that SMEs have limited resources, technologies and capabilities although the less complicated structure allows smaller firms more flexibility to changes (Al-Qirim, 2004; Girgin, Kurt & Odabasi, 2011). According to Sife et al. (2010), the use of mobile phones by small enterprises in Morogoro region help to reduce travel time and monetary costs; decreases physical risks; and increases the outcomes of those necessary journeys. Furthermore, increased temporal accessibility enables people to manage several activities regardless of their physical location.

2.3.1 Conceptual Framework

The conceptual framework of this study comprises three types of variables: background, independent and dependent variables. The background variables consist of the socio-economic status of the SME owners or household attributes. There are some factors leading to low adoption of ICT in SMEs particularly as analyzed in the table below.

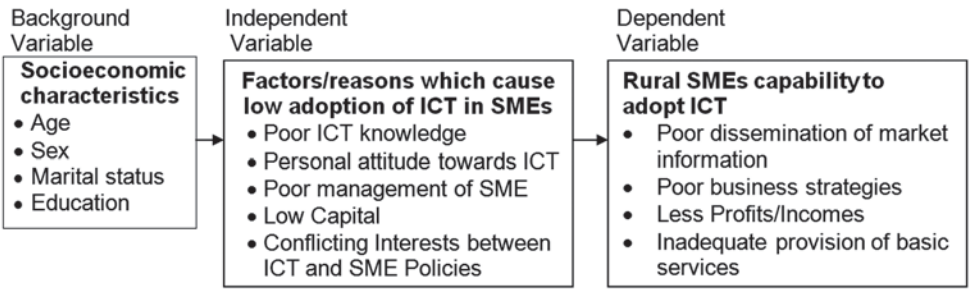

Figure 1: Factors leading to low adoption of ICT in SMEs

2.3.2 The Operational Definitions Among Variables

Table 2: Operational Definition of Variables

VARIABLE	OPERATIONAL DEFINITION
Knowledge	Level of education or skills attained
Attitude	The idea, feeling or perception about something
Management	Ability to control something
Capital	Asset possessed in financial or social form
Interest	Tendency of preferring something

3.0 Methodology

3.1 Overview

3.2 Description Of The Study Area

The study was conducted at Kilosa District in the Morogoro region. Kilosa is one of the seven districts of Morogoro region located in Eastern Central Tanzania which is about 300 km West of Dar es Salaam and is found at 5°55' and 7°53' Latitude S and 36°30' and 37°30 Longitude E. Kilosa district is bordered by Mvomero District to the East, Kilombero and Kilolo districts (Iringa region) to the South, Gairo, Kiteto (Manyara region) and Kilindi (Tanga region) to the North; and Mpwapwa district (Dodoma Region) to the West. It covers a total area of 14,245 square kilometers. The climatic condition of the district varies depending on the agro-ecological zones. The highest parts of the district are 2,200m above sea level, gets annual rainfall between 1000mm–1600mm.The central and southern areas experience an average rainfall of 800mm-1400mm. The annual temperature is typically between 25°C-30°c. The main economic activities are agriculture and livestock as well as business on small scale (URT, 2010). In the Kilosa District, ICT services are mainly provided through telecommunications. The Tanzania Postal Corporation and Tanzania Telecommunication Company limited are providing telephone services all over the district (Movek, 2008).

3.3 Research Design

This study used a cross sectional design in which data was collected at one specific point in time from a selected sample of respondents. According to Bailey (1994), this is the most appropriate research design in instances where there is a shortage of financial and time resources.

3.4 Data Collection

Specific objective (SO)	Primary Data	Secondary Data
SO1: To determine the ICT adoption rate in comparison with the general number of SMEs	structured questionnaire based on closed-and open-ended questions	Books, journals and the internet
SO2: To determine the challenges facing SMEs in the process of adoption of ICT	structured questionnaire based on closed-and open-ended questions	Books, journals and the internet
SO3: To assess the awareness of SME owners on the importance of ICT in their business operations	structured questionnaire based on closed-and open-ended questions	Books, journals and the internet
SO4: To assess the accessibility of ICT tools in areas of business operations among SMEs	structured questionnaire based on closed- and open-ended questions	Books, journals and the internet

3.5 Data Analysis

Primary data were summarized, coded and analyzed using the Statistical Package for Social Science (SPSS). In this package, descriptive statistics such as frequencies, percentages and means were used.

Table 4: Objective-wise analysis technique of data

Specific objectives	Analysis of primary data	Analysis of secondary data
SO1	The collected data was summarized, edited, recorded and analyzed using SPSS.	Secondary data was analyzed through the existing dataset, which had previously been collected by other researchers.
SO2	The collected data was summarized, edited, recorded and analyzed using SPSS.	Secondary data was analyzed through the existing dataset, which had previously been collected by another researcher.
SO3	The collected data was summarized, edited, recorded and analyzed using SPSS.	Secondary data was analyzed through the existing dataset, which had previously been collected by another researcher.
SO4	The collected data was summarized, edited, recorded and analyzed using SPSS.	Secondary data was analyzed through the existing dataset, which had previously been collected by another researcher.

3.5.1 The Target Population Studied

This study involved all groups of important respondents, especially individuals owning and operating SMEs within Kilosa District.

3.5.2 Sampling Technique and Sample Size

In this study, both probability and non-probability sampling during the process of selecting targeted population were used. There was a random sampling of sixty (60) community members. The table of random numbers was used to randomly select the individuals for the sample. The selected villages were stratified according to sex in order to have equal gender representation in the sample members.

4.0 Results and Discussions

In this section, the findings and discussions of the study are presented together with the research objectives, which is to assess the socio-economic impacts of low adoption of information and communication technologies (ICTs) on small and medium sized enterprises (SMEs). This study is divided into the following subsections: demographic characteristics of the respondents including age, sex, marital status and education level; discussion on ownership of SMEs; common types of SMEs operated within Kilosa district; key ICT tools used by the SMEs; important information needed by SMEs; influences of ICT adoption in SMEs; impacts of lack of reliable sources of information among SMEs; and the usefulness of ICT adoption in SMEs.

4.1 Age

Age is one of the key determinants of individual participation in SME activities and ICT usage respectively. The study shows that the age of individuals, who are very actively engaging in SME activities and using ICT, ranges from 20-29 years which actually is 36.7% of the total number of respondents while only 7% of the most aged population, ranging from 50-59 years, are dealing with SME activities and ICT usage respectively. On the other hand, a very small portion of the middle age population has adopted ICT: 15% of the 30-39 years age group and 16% of the 40-49 years age group.

4.1.2 Sex

The study involved both male and female respondents of which 35 were men and 25 of them were women. The selection process was done randomly based on the fact that both men and women have equal chances of participating in SME activities.

4.1.3 Marital Status

Most of the interviewed respondents were found to be married (48.3%) while 35% were single. Around 10% were widowed and 6.7% divorced. This shows that a large proportion of respondents were married couples engaging in several micro-enterprise activities.

4.1.4 Education Level

Education is the principal mechanism for imparting and developing any necessary skill and knowledge for human development, particularly technological innovations in SMEs. The survey revealed that 38.3% of the respondents had primary level education, while 36.7% of the respondents had secondary level education. Also 6.7% had higher education and 18.3% had informal education. These findings show that a majority of the respondents had primary and secondary level educations while the lowest proportion had higher level education. This shows that there is no direct relationship between education level and SMEs operations.

4.1.5 Main Economic Activities

This study has found that most of the respondents were dealing with private income generating activities in which 8.3% are dealing with agro-inputs supply, 6.7% deals with mobile money transfer, food vending and selling of second hand clothing.

Table 5: Age-wise rate of adoption of ICT

Age	Frequency	Percentage
20-29	22	37.6
30-39	15	25
40-49	16	26.7
50-59	7	11.7
Total	60	100

Table 6: Marital status of the respondents

Marital status	Frequency	Percentage
Married	29	48.3
Single	21	35
Divorced	4	6.7
Widowed	6	10
Total	60	100

Table 7: Level of education of the respondents

Level of education	Frequency	Percentage
Higher education	4	6.7
Primary education	23	38.3
Secondary education	22	36.7
Informal eduction	11	18.3
Total	60	100

Table 8: Occupation-wise distribution of the respondents

Occupation	Frequency	Percentage
Agro-chemical store	6	10
Food vending	2	3.3
Pharmacy	3	5
Clothing	1	1.7
Motor Cycle spare parts	2	3.3
Cosmetics	4	6.7
Butchery	4	6.7
Multi-products store	10	16.7
Decoration agent	1	1.7
Office and school stationery	5	8.3
Timber store	1	1.7
Poultry keeping	1	1.7
Mobile money transfer	9	15
Welding	1	1.7
Mattress store	2	3.3
Flesh fish store	1	1.7
Tailoring	3	5
Carpenter	2	3.3
Grain store	1	1.7
Car maintenance	1	1.7
Soft Drinks	2	3.3
Total	60	100

Source: Field Data (2013)

4.2 Adoption Rate of ICT among SMEs

This study found that 98.3% of the respondents use ICT tools in accessing necessary information related to their business. Only a small portion of respondents (1.7%) do not use ICT tools in daily operation of their businesses. The rate of ICT adoption is determined by several factors among which are awareness (knowledge) of the enterprise owners, amount of capital of the particular business venture and form of ownership of the business.

4.4 Key ICT Tools used in SMEs Operation

This study found out that there were several types of ICT tools introduced by the SME entrepreneurs in their businesses in order to facilitate communication process. The most used tool are the mobile phones, whereby 70% of them are using it to seek some useful information related to their daily operations of business such as placing orders for commodities and informing potential customers about the presence of certain products. SPSS is the popular ICT tool because of its easy accessibility, usage and affordability. On the other hand, 10% of them are using computers and radio, while 6.7% uses television and 3.3% rely on newspapers as described in the following chart.

Table 9: Popularity of ICT Tools among SME Entrepreneurs

Key ICT Tools used in SMEs	Frequency	Percentage
Mobile Phones	42	70
Computers	6	10
Television	4	6.7
Radio	6	10
Newspapers	2	3.3
Total	60	100

4.5 Challenges of ICT Adoption in SMEs

The results of the study indicate that some challenges hindering high adoption of ICT in SMEs. These are: 51.7% think it is the low level of ICT base particularly in the SME sector, while 21.7% hinted technical issues with some ICT tools; 18.3% pointed at high adoption costs and 8.3% complained about complexity knowledge of ICT. The low level of ICT base is due to poor economic status of the nation at large.

4.6 Strategies Towards Improvement of ICT Adoption in SMEs

The results from respondents' interview suggest some possible measures to solve the problem of low adoption of ICT in SMEs. 31.7% said the Government should promote the locally-based ICT innovators by allowing them access to new innovation. 26.7% of the respondents suggested provision of education related to ICT innovation and reduction of tariffs on ICT tools. The remaining 15% suggested creating a strong base of ICT related economy especially in rural SMEs.

Table 10: Challenges in accessing ICT tools in SME

Challenges	Frequency	Percentage
High adoption cost	11	18.3
Complicated knowledge of ICT usage	5	8.3
Technical problems of ICT gadgets	13	21.7
Too level of ICT base in SME industry	31	51.7
Total	60	100

5.0 Conclusion and Recommendations

The general objective of this study was to assess the impacts of low adoption of ICT in SMEs in Kilosa District. The following section provides the conclusion of the study and makes recommendations for further research arising out of the research findings.

Table 11: Strategies towards improvement of ICT adoption

Strategies	Frequency	Percentage
Provision of education to ICT related innovation clients	16	26.7
Reduction of tariffs to the imported ICT related products	16	26.7
Creation of a strong ICT based economy	9	15
Promotion of locally based ICT innovation	19	31.7
Total	60	100

5.1 Conclusion

The assessment of low adoption of ICT in SMEs indicated some factors that hinder most of these micro-enterprises in Kilosa district in not successfully adopting ICT in their undertakings. Those factors include: high costs of ICT adoption, low awareness of the importance of ICT, ineffective government policies concerning adoption of ICT sector in economic development and inefficiency of the economic base that supports rapid technological changes particularly in ICT.

5.2 Recommendations

Based on the above conclusions, the problem of low adoption of ICT in SMEs could be solved through the following measures:

* Reviewing the National ICT Policy strategies in order to provide a room for it to have coordination with other related policies so as to promote its growth. For example, it should clearly indicate how it is linked with the national micro-finance policy because SME owners cannot be influenced to adopt ICT innovations without being motivated by the ICT policy itself.

* Reduction of tariffs on imported ICT tools, specifically those used in SME operations. This will allow the SME owners, who need to have extensive uses of ICT in their business operations, have better chances of expanding their undertakings hence promoting economic growth and reducing poverty on the whole.

* Promotion of locally based ICT innovators and clients; the Government and other non -governmental institutions should work together to support the local experts, who want to invest in ICT innovations, particularly in education and micro-enterprise sectors. National Agricultural ICT Incubator (NAII) needs to be established and it must be well connected with some networks of Living labs. On the other hand, those government and non -government institutions should provide some kind of incentives to individuals or groups who wish to invest in promoting ICT in SMEs. Thus, for successful adoption of ICT in SMEs, there is a need of good linkage between policy, innovation, competition, delivery channels and demand. These factors are what helped M-PESA to be very successful in Kenya while in other countries it has outperformed (Foster & Heeks, 2012).

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Women Empowerment through Online Clothing Stores in Bangladesh: Prospects, Barriers and Challenges

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Abstract

Bangladeshi women are lagging behind in terms of economic empowerment. However, ICTs have the potential to empower women in entrepreneurship through social media. Also the Bangladeshi retail industry has witnessed major changes with the availability of Internet in Dhaka city. No doubt the most common sector of retail market today is the clothing segment, especially the e-clothing market. Since 2010, multiple online clothing stores, initiated by housewives, working women and female students, have emerged. This study explores how women in Dhaka are using ICTs, especially social media, to empower themselves through e-commerce. This paper attempts to find out the prospects, barriers and challenges of women-owned online clothing stores. This paper conducted in-depth interviews with ten women, who run online clothing stores. This paper concludes with a discussion of prospects, barriers and challenges of maintaining online clothing stores and strategies adopted by female entrepreneurs to attract consumers.

Key Words

ICT, Empowerment,E-commerce, Social Media, techno-feminism

Background

E-Commerce has become an important part of everyday life for the consumers of the 21st century. In the context of the developing world, e-Commerce projects are considered “potential goldmines” for women empowerment. The study is motivated by the potentially powerful role that information and communication

technologies (ICTs) can play in empowering women. According to Maier and Nair-Reichert (2011), “ICT allows women’s increased participation in political, social and economic arenas and supports empowerment for themselves, their families, and their communities” (p. 44). In this context, e-commerce/e-retailing projects facilitate the empowerment of women. Therefore, this paper focuses on the prospects, barriers and challenges faced by women in managing e-commerce/e-retailing projects through social media.

With the advancement of digital technology in Bangladesh, consumers’ shopping behavior has shifted greatly. Nowadays, progressive consumers go shopping on the web. Bhowmik, China and Daoyi (2012) reported that the banking sector of Bangladesh had already seen the introduction of Internet payment systems that helped fund transfers and payments of utility bills.They observed that the Internet population style of Bangladesh was also contributing to the development of the Asian countries, which ensured a 450% development from 2000-2007. The Bangladesh Telecommunication Regulatory Commission’s latest National Media Survey placed the total Internet users in Bangladesh at 30.48 million as of January 2013. The Facebook population in Bangladesh is now 3.39 million. Facebook adds one new user from the country every 20 seconds (Genilo, Akther and Haque, 2013).

According to one of the country’s leading newspapers “The Independent” (September 24, 2013), the online shopping trend in Bangladesh started around the year 2010. Sites like Akhoni.com, Clickbd, Cell Bazaar, and Bikroy.com, among others, were established. A representative of Akhoni.com stated that Bangladesh was making progress in IT sector day by day. As a result, more and more people are getting access to Internet, social media, smartphones, etc. Bangladeshi e-commerce industry always believed that it was just a matter of time before people started shopping online like the rest of the world (The Independent, September 24, 2013). Moreover, the billion dollar e-commerce industry in neighbouring India was something that encouraged Bangladeshi online sites to go forward. As estimated by Euro-monitor report, electronic retail growth in India touched Rs2,700 crore in 2010 (Arora, 2013).

In the context of heavy traffic in Dhaka, online shopping saves people a sizable amount of time that they can utilize elsewhere. E-retailing in Bangladesh includes purchase of durable products such as electronic items, home and kitchen appliances, and personal items such as clothing, jewelry and other accessories. Attributed to broadband and mobile penetration, 3G, using credit cards or bKash, cash on delivery, Internet banking has led to a surge in online transactions.

Around the same year that is 2010, Facebook gained considerable popularity among Bangladeshis as an active social networking platform. Entrepreneurs, who could not afford to put up a website, started to recognize the potential of Facebook. Thus was the rise of Facebook business. It started with the sale of clothes – salwar kameez and sarees of different home-based boutiques (The Independent, September 24, 2013). The first in this league was Safwan Rizvi, founder of Hardstyle Revolution (HR) who gained immense popularity with 14,543 customers

in just three years. In an interview with the Youth Spark magazine published June 2013, Rizvisaid back in 2010 there was hardly any online clothing store from where people could buy T-shirts, jeans, watches, shoes, etc. Those handfuls that were already there were beyond the affordability of everyone, neither could they go shopping outside Bangladesh. So, Safwan decided to launch the first online clothing store in Bangladesh where people could shop the trend online at affordable prices.

“When a main street store builds a website, they open up opportunities to expand their market beyond geographical boundaries. The chances of losing sales from the physical shop are slight, but the potential to increase sales through their website could be enormous” (Tiernan, 2000 stated in Arora, 2013). Exactly the same thing happened in Bangladesh. The women-owned clothing store Style World started its journey with a physical showroom at the Pink City Shopping Mall in Gulshan in 2005. Recently, Style World also started operating through Facebook to attract customers beyond the borders. Currently,the Facebook page of Style World has six hundred thousand likes.

However, the opposite thing could also be seen in Bangladesh. For example, designer duo Eeman Ahmed and Farah Deeba – brainchild of Andeem – started out on Facebook and eventually grew their business to such an extent that they have now become an established fashion brand with their own flagship store in Banani (The Independent, 24 September, 2013). Also, Facebook emerged as a platform for exposure for aspirant female designers.

It is also noticeable that the female owners of online clothing stores come from all walks of life – teachers, doctors, students, housewives, IT professionals, and designers. What started out as a part time business or hobby soon turned into a moneymaking venture that they had dreamed. This platform enabled them to earn extra money while still pursuing the career of their first choice.

According to The Independent (24 September, 2013), the ease of creating a Facebook page enabled the entrepreneurs to quote prices that were very competitive because the overhead costs associated with running a physical retail outlet were out of the equation. Since there are no salespersons, customers can speak directly with the owners and build a rapport, resulting in enhanced brand loyalty and customer satisfaction. Moreover, online payment methods such as bKash and e-banking made monetary transactions simpler.

However, many people avoid online shopping because they cannot touch and feel the product in person. There had been many reported cases where unscrupulous individuals took advance payments and either disappeared or delivered the wrong items. Some others took so long to deliver the ordered items that customers were left wondering whether they would ever get the items they had ordered (The Independent, 24 September, 2013).

ICT and Women Empowerment

In 2002, the annual UNCTAD (United Nations Conference on Trade and Development) report on e-commerce and development hailed e-commerce as a "potential goldmine" for women in the developing countries because of its great potential for women empowerment. ICTs are increasingly promoted as a key solution for comprehensive development, poverty eradication and the empowerment of historically disadvantaged groups such as women and minorities in the Global South.

However, experience has also shown that the effective application of any new technology must recognize that technologies are not gender neutral, neither in design, nor in implementation (Rosser, 2005). On the other hand, Maier and Nair-Reichert (2007) have argued that ITs have the potential to "redefine traditional gender roles" and that "the spread of IT-enabled services has been immensely beneficial for both women and men, especially those who have limited skills or lack of resources to invest in higher education" (p. 45). Therefore, Maier and Nair-Reichert (2007) called ICTs the "great equalizer" and pioneers in the field of gender empowerment.

Still today, women are often discouraged both at family and village levels, in their entrepreneurial efforts. Often the fear that it may change or shift the power structure creates hurdles in their paths. Many women are also uncertain about their professional opportunities once they get married. In addition, juggling household responsibilities and work responsibilities can be very challenging and may result in women opting out of the ICT-driven developmental efforts (Maier and Nair-Reichert (2007).

It must be noted that although culture may and does inhibit women's ability to engage in economic opportunities, it is not static and does not preclude women from all sorts of agency. Maneja (2002) points out that culture can open paths to power (p. 32). For example, women can focus on the enabling structure of culture, such as an emphasis on child rearing, their cooking skills or expertise in weaving or embroidery to open opportunities for social and economic empowerment. Indeed e-commerce/e-retailing projects; Tortas Peru, Women Weavers in Morocco, Elsouk, Ethiopia Shop, and the CI-GM project are clear examples of women's successful capitalization on traditional female skills. Therefore, successful ICT for development projects work within a culture assuming that women are resourceful, and if given the opportunity, will exercise their agency for change (Maneja, 2002, p. 32).

Women Entrepreneurship through Social Media

There is no doubt that ICTs can help women gain employment and increase their income through e-businesses. Some claim that women are technophobic and that men are better users of the digital tools, while others argue that women enthusiastically embrace digital communication (Hilbert, 2011). Men like the

Internet for the experiences it offers, while women like it for the human connection it promotes (Fallows, 2005, p. 1). Traditionally, women tend to be more social and talkative than men. Social media gives them another forum for building and maintaining relationships. Therefore, Kinsey (2013) stated that women rule the social media world. It is also reported that the monthly number of female visitors to twitter was 40 million more than masculine visitors. Also, women on Facebook participate in 62% of the sharing and have 8% more friends than men (Kinsey, 2013).

In e-commerce, female purchasing power is also pretty clear. Sites like Zappos, Groupon, Gilt Groupe, Etsy, and Diapers are all driven by a majority of female customers. According to Gilt Groupe, women construct 70% of the customer base and drive 74% of the revenue. Hegman (2013) surveyed a sample of 1,005 female social media users, 17% of which were between the ages of 18 and 24 - the core of the millennial generation. He labeled the millennial as “social shoppers.” They talk to their friends about their fashion purchases and are influenced by the input they receive.

Targeting the millennial, online clothing store Wildfang started selling trendy and fashionable clothes to young girls. Wildfang wanted to reach a young and hip audience that would be receptive to its unique products and designs. Social media seemed the logical place to do so (Giesen, 2013).According to the Dallas Morning News (November, 2013), Amy Laws and Nicole Metzger Brewer earned $4 million this year from their online boutique by selling on the social networking site. Small businesses and female entrepreneurs like Laws and Brewer are driving a new wave of e-commerce on Facebook, known as f-commerce. These retailers sell exclusively on Facebook or generate most of their sales on the site.

Clothes retailers, from Gap to Saks and Macy’s, have been seeking ways to profit through sites such as Facebook that offer access to more than a billion consumers. Lolly Wolly Doodle (founded in 2010), a women-owned retail company selling kids clothes,does most of its selling on the Facebook, using the social networking site to set prices, take orders, forecast production and even market and design clothe (Kucera, March, 2013). A similar argument is made by the Lisa Gavales, chief marketing officer (CMO) of “Express,” a leading cloth brand for women and men. Gavales (2013) said “Social media is simply a vehicle for conversation that takes place between our brand and our customers.”

Therefore, it can be concluded that the ICTs would present a unique opportunity for the Bangladeshi women to prosper. E-commerce and f-commerce would be perfect tools to fight the existing disparities between men and women in terms of entrepreneurship. The ICTs provide women entrepreneurship with the much needed access to worldwide e-business channels allowing 24/7 real time operation even from home. Therefore, ICTs enable meaningful participation of women in the field of e-commerce in Bangladesh.

Objectives of the Study

1. To explore factors that amount to the growth of women-owned online clothing stores in Bangladesh.

2. To find out the barriers and challenges that the women-owned online clothing stores in Bangladesh face.

3. To determine the strategies adopted by female owners to persuade their customers online.

Research Questions

1. What are the factors behind the growth of women-owned online clothing stores in Bangladesh?

2. What are the barriers and challenges for women-owned online clothing stores in Bangladesh?

3. What are the strategies adopted by female owners to persuade their customers online?

Related Literature

This paper first discusses some prior works of foreign scholars, who worked on prospects, growth and challenges of maintaining online clothing stores. This section starts with an overview of the current e-commerce situation in Asia, especially in Bangladesh. Then it moves on discussing the growth, barriers and challenges of the e-retailing industry. The literature review ends with a study framework which talks about liberal feminism and techno-feminism as a study framework.

Current e-Commerce Situation in Asia

E-commerce is identified as selling, buying, distributing, marketing, and servicing of products online (Bhowmik, China and Daoyi, 2012). Nowadays an increasing number of dealings in global trade are carried out online. Japan, China and India are the most significant e- commerce bases in the Asia-Pacific region (Bhowmik, China and Daoyi, 2012).

* According to Asia B2C E-Commerce report December 2011 and February 2013:

* 80% of the Japanese online audience visited retail websites.

* B2C E-Commerce sales in South Korea reached more than 10 billion EUR. It is also noticeable that besides mobile commerce, social commerce is also a growing trend in South Korean online retail.

* B2C E-Commerce in China is expected to grow by more than 30 percent annually between 2010 and 2016. Overall, clothing, fashion, shoes and bags, as well as computers and household appliances are among the most popular online product categories. Also a growing number of Chinese residents use social networks to purchase products online.

* Major B2C E-Commerce players have launched operations in the Indian market as well. In July 2012, online mass merchant Flipkart had the highest number of unique visitors, followed by Snapdeal, another mass merchant, and Jabong, online retailer of clothing and accessories.

* The most purchased online product categories in Vietnam in 2012 were clothing and household goods, followed by food and beverages.

Present e-Commerce Situation in Bangladesh

In this area, the existing literature that focuses on online shopping in Bangladesh discusses about country's present e-commerce situation and the developments in online shopping intentions among Bangladeshis. Bangladesh has in recent times made significant progress in developing the Internet and information communication. The number of IT users in Bangladesh is increasing rapidly. As Internet becomes more affordable and available in Bangladesh, it is becoming clear that online sales will spring up. It is expected that competition in this sector will grow faster as online shopping trends expand.

According to a report from the International Telecommunication Union (ITU), Bangladesh had 450,000 Internet users in 2007 and all the districts headquarters had cyber cafes (Laisuzzaman, et. al., 2010). Online commerce also increased gradually. The size of the domestic market was estimated to grow to more than Tk300 core in a year (Lasiuzzaman et. al., 2010).

However, in Bangladesh, public awareness about the benefits of information and communication technologies and their diverse usage is limited (Parvin, et al 2007). Moreover, poor people, who comprise the majority of the country's population, have limited access to Internet and ICT services. On the other hand, the youth, accounting for more than 35 percent of the total population, gives Bangladesh an edge to choose e-commerce (Laisuzzaman, et. al., 2010). Moreover, the high-income and -educated people, who are the major customers online, live in major the towns, where network infrastructure is comparatively better. People become habituated with Internet officially and personally that positively influence the development of online shopping in Bangladesh.

Bhowmik, China and Daoyi's paper (2012) gives an overview on the current online shopping trends across the country. According to the paper, Dhaka shops for fashion clothing, shoes and jewelry in e-retailing. Chittagong-based online retail stores sell desktop, laptop, tablet and notebook computers, Khulna-based sites toys and baby products, Rajshahi-based ones music, movies and games

wholesales; and Sylhet-based websites for sports and outdoors.

Growth, Barriers and Challenges of e-Commerce

After reviewing literature, some important growth factors were revealed that boosts online shopping. Customers prefer shopping online because it can be done quickly and at affordable prices (Howladar et. al., 2012). Online shopping is more convenient and makes price comparisons easier (Ahn, et al. 2004). Arora (2013) mentions that People nowadays find it easier shopping online, as the products get home-delivered, coupled with the facility to shop 24x7. Thus, an online buyer saves precious time, extra efforts and money while buying online as compared to buying from physical stores.

Eroglu et al. (2001) has advocated that the most important thing in traditional retailing is setting up physical stores. According to them, it is largely determined by the cost of real estate and the various physical objects required for creating sounds, aromas, colours and lighting. In this context, Arora (2013) states that e-Retailing eliminates the need for maintaining expensive and fancy showrooms. Instead, what attract customer attention to online stores are the “great deals,” “best prices” and “better bargains.”

Dawn and Kar (2011) has said the success of e-retailing depends on effective shopping and prompt delivery, the growth of mobile communication and increased use of Internet banking and debit and credit cards. Arora (2013) adds that emergence of nuclear families and the latest trends in social networking have acted as growth factors for online clothing stores.

Social media not only drives people to make online purchases, it also drives an equal volume of in-store sales. In the July/August 2013 issue of the Harvard Business Review, data from the USA, Canada and the UK demonstrates that customers browse online and buy offline. It is also reported that half of the social media-related purchasing takes place within one week of sharing the ultimately purchased item.

However, scholars have identified some of the challenges and barriers for e-commerce. One of the important barriers is the risk associated with online payments (Shankar, et al. 2003). Risk associated with privacy and security also holds back people from going for online shopping (Zhou, et al.2007). People are not merely concerned about security of value but also about trust in the information society, and how information is used by the government and businessmen. Therefore, the lack of trust discourages online consumers from participating in e-commerce (Chen and Barnes, 2007).

Goswami and Khan (2012) reported that consumers will display a bias for brands that they know well and have had a good experience in the past. They also identified lack of “touch-feel-try” experience, untimely delivery of products and offline presence of retailers as the major challenges for e-retailing. Similarly, Arora

(2013) identified all the above mentioned barriers in the context of e-retailing. Arora (2013) added that the lack of trust between buyer and seller and cybercrimes are major challenges and barriers for the online retail industry.

Study Framework

The present study talks about women empowerment by using social media as a significant tool. Therefore, this study takes “Liberal Feminism” as a theoretical base. Liberal feminists work towards an egalitarian society that would uphold the right of each individual to fulfill their potential. According to Fischer et.al. (1993), the liberal feminist tradition goes back to feminism’s earliest days (the first wave feminism) and argues for the necessity of social reform in order to give women the same status and opportunities as men. A liberal feminist approach wants more women in the technical fields. However, this approach presents technology as gender neutral and equal to all. So, according to liberal feminists, individual women are left with their choices and responsibilities. It is up to women themselves to enter into the field of technology (Paakki, 2008).

During the 1990s, researchers observed that women tend to be latecomers to the digital age. As a consequence, the new technology was popularly portrayed as a male domain (Dholakia, 1994). Researchers claimed that women underestimated their actual usage skills which led to lower ICT efficiency as well as shortcomings in their general attitudes towards computers (Hilbert, 2011). Fallows (2005) concluded that “men are more interested in technology than women, and they are also more tech savvy” (p. 5). In short Hilbert (2011) stated that women were seen as being more likely to be technophobic. This type of reasoning is in line with a longstanding argument that technology is gendered.

In contrast to those findings, some case studies and anecdotal evidence show that ICT can and are empowering women in the developing countries. ICTs enable meaningful participation and make female voices heard, as proven by the role of digital networks in feminist movements (Harcourt, 1999). In short, ICTs can be “powerful tools for women to overcome discrimination, achieve full equality, wellbeing and participation in the decisions that determine their lives and the future of their communities” (Hilbert, 2011, p. 8).

At this point, Wajcman’s (2004) concept of technofeminism can be used as the optimal solution to barriers blocking women’s access to the management of new technologies. Technofeminism proposes to reinforce the social mechanisms necessary to favour the full inclusion of women in the use of technology. This would avoid the so called “digital gap” and recover a sphere, traditionally associated with the masculine, for women (Wajcman, 2004).

Research Methodology

Coverage of the Study

This research paper is confined to the study of the prospects of the women-owned online clothing stores in Dhaka city.

Method and Design

This paper's design is exploratory, qualitative and descriptive. It utilized primary and secondary data. The primary data came from the open ended, in-depth and interactive interviews of women, who operate online clothing stores through social media in Dhaka city. Secondary sources include journal articles, reports on e-commerce and f-commerce, newspaper and magazine articles. Qualitative data was analyzed using an analytical deductive method and presented using matrices.

Selection of respondents

This present study selected ten women, who run online clothing stores on Facebook thus using the social media as a platform for women empowerment. The selection of respondents is purposeful – ten women, who see online business as their primary source of income. They import Indian/Pakistani designer clothes and sell it to the customers. Some of the women are also trying to establish themselves as an upcoming designer by selling clothes of their own designs. These women are mostly housewives and students. Some of them are engaged in part time or full time jobs. The profiles of these online stores are given below.

Profiles of the Women-Owned Online Clothing Stores

Areej *(Founded February 2013)*

Areejis an online fabric collection which sells quality Pakistani lawns for females at reasonable prices.

Wazalla *(Founded June 2012)*

Wazalla sells unstitched Pakistani designer wears. They offer customers with elegant designer clothes that reflect their exclusive range of unstitched ensembles.

Viola *(Founded June 2011)*

Viola provides customers with a variety of collections of women's clothing. The store tries to provide "unmatchable designs." They understand the demand for unique style of clothing and offer customers incomparable designs in the world of attire at very economic bundle prices.

Mitira's *(Founded May 2013)*

Mitira's offer smart casuals to semi-formals to exclusive party wear for females at unique prices. The boutique has a unique and exclusive collection of fabulous Kaftans, Kurtis and dresses.

Suvastraa *(Founded May 2011)*

Suvastraa started off make people's life easier by facilitating shopping on the net (Facebook) sitting right at home. The online store presented a new refreshing clothing line for women at reasonable prices.

BTG Fashions *(Founded March 2013)*

BTG Fashions targets fashion conscious women. It sells and promotes mostly Pakistani designer lawn at very competitive prices.

SIA Collections *(Founded August 2011)*

SIA Collections is an online boutique offering the latest Pakistani brand wears from various renowned designers and fashion houses. They sell genuine and quality products for fashion conscious and shopaholic women.

Serenity *(Founded January 2012)*

Serenity strives to bring beautiful and elegant dresses to the fashion sensitive Bangladeshi women. Serenity believes that every woman should have access to the latest designs and fashion trends in the country.

Aroush *(Founded September 2013)*

Aroush is an online store offering modern and trendy collections of men's wear, women's wear and accessories at reasonable prices.

Nananta *(Founded February 2013)*

Nananta means a partner of elegant personality.
The store brings quality products like sarees, bed sheets and nakshikantha sat standard prices and a lot of exciting offers from time to time to attract customers.

Research Findings

This section is divided into the following: Digital Inclusion/Exclusion, Gender Upbringing, ICT and Women Empowerment, Growth Factors of Online Clothing Stores, Challenges and Barriers of Online Clothing Stores and Strategies Adopted to Attract Customers Online.

Digital Inclusion/Exclusion

The study conducted in-depth interviews with ten women who run online clothing stores on the Facebook. They were aged from 22 to 55 and all of them are Muslims. In terms of education, the mix was quite interesting. Only one respondent studied up to the higher secondary level. Seven of them were graduates and two had MBAs. The respondents first described their access to computers/Internet, followed by their purpose of using computer/Internet. This section ends with the description of the social support that the respondents enjoy in using ICTs.

In terms of computer access, some respondents had early access to computer and some respondents got access after their higher secondary education. One respondent had her first experience of using a computer at grade 2 as her school had a computer laboratory. Two respondents had their first experience quite late, i.e. after the Higher Secondary Certificate (HSC) examinations and after becoming graduates respectively. One respondent, who used computer after graduating, narrated: "My husband taught me how to use computer after our marriage. He encouraged me to open a Facebook account so that I could stay connected with my relatives." The last respondent of this study first used computer at the age of 55. "My son motivated me to learn computer and start an online clothing store so that I could become independent" – she narrated.

Matrix 1: Description of Computer/Internet Access by Respondents

Indicators	Description
Access to Computer	She started using computer in grade 2 as she studied in an English medium school. Now she uses her own laptop, tablet and ipad. She first used computer in grade 5 in school as she went to an English medium school. Now she has personal computer, laptop and ipad at home. She first used computer in 2003 at the age of 13. It was a regular PC, Pentium 4. Right now she has her own laptop. She first used computer in grade 8. Her father bought a computer for her. Now she owns a laptop, tablet and ipad. She first used computer after her HSC. Then it was only for educational purpose. Now she uses desktop and laptop to run her business. She first used computer in 2006 after her undergraduate from cyber cafe. Now she owns a laptop and tablet. She has just started to use computer for business purpose at the age of 55. Her son helps her to operate computer and internet.
Access to Internet	She first used Internet in grade 5 in Switzerland as she did her schooling there. She uses broadband, wi-fi and mobile Internet connection. She used Internet in grade 8 at school. She uses broadband and wi-fi at home now. She uses 3G in her mobile and tablet when she is outside home. She used Internet during O'levels at school. Now she uses wi-fi at home and 3G through mobile outside. Right after she finished HSC, she was provided with Internet. At that time she has only dial up connection. So she used Internet only for e mail. Now she uses a portable modem of Banglalion Wimax and wi-fi at home. She used Internet after her undergraduate. She uses Qubee (a broadband Internet Service Provider that uses Wimax technology). She started using Internet very late, at the age of 55. She has a Qubee connection. She uses only desktop and laptop.

During the interviews, it was found that all respondents owned a laptop. Most of them also had their own ipads and tablets except the woman who started business at the age of 55. As for Internet connection, they have broadband and wifi at home. The 3G mobile Internet connections of Grameenphone and Banglalink are also very popular especially for use outside home.

All respondents use computer and Internet for business purposes as they run online clothing stores. They stay connected with their customers through the Internet. However, they also use ICT for entertainment, social networking (Facebook and Skype) and online shopping. Three respondents also use ICT to get recent news (they mostly visit www.bdnews.com) and two respondents use ICT for research.

All respondents get social support for using ICT from their parents and husbands. However, two respondents reported that their in-laws possess negative attitude towards their social media usage as they need to communicate with strangers for business purpose. It was found that their parents or husbands pay their Internet bills, presented them i-phone and tablets and relatives even help them to choose the proper equipment. One respondent narrated: “As I am backdated and know little about technology, my son teaches me how to use Internet and run my business online.” Therefore, all respondents go online everyday and maintain their online clothing stores smoothly.

Matrix 2: Description of the Quality of ICT usage by respondents

Indicators	Description
Purpose of ICT Use	She uses Internet for study purpose, social networking (Facebook and Skype), online business and research. She uses ICT for business, entertainment, social networking, news and online shopping. Initially she used it for Study purpose and entertainment. Now she uses it for social networking, news functions and to run her own business.
Social Support for ICT Use	She has full support of her parents and husband in using ICT. However her in-laws showed negative attitude about her using ICT. Her family, friends and relatives are supportive in her ICT use. Even her husband pays her Internet bills and gifted her Samsung Tablet. She has support of her family and relatives in using ICT. Her family pays her Internet bill and bought her an i-phone. Her relatives support her in using ICT. They even help her in choosing the right brand for the equipments needed to use. She gets family support in using ICT both in terms of monetary sense and mental support. She has support from family. As she is backdated in computer technology her son helps her to use ICT.

Gender Upbringing

Most of the respondents stated that there was no gender discrimination at home. One respondent stated: “My family believes in gender equality and feminism.” Another said: “I never faced gender discrimination at home. I and my brother went to the same school and university.” Actually most respondents belong to households that are modern and liberal. However, one respondent reported that she faced gender stereotyping to some extent. “Women are not allowed to work outside in my family. This is my primary reason for choosing online business so that I do not need to go out,” she narrated. However, both male and female family members participate equally in decision making and opinion sharing.

Matrix 3: Description of Gender Upbringing by respondents

Indicator	Description
Gender Role	Her family believes in gender equality and feminism Yes. She sometimes faces gender stereotypes. In her home females are not allowed to work outside. Only men can work outside. There are sex role differences in doing household chores but females always participate in decision making and opinion sharing. She is from a modern and educated family where both males and females work outside. Both males and females share the household chores No sex role differences at home. Her father cleans home on Fridays. Her mother cooks always because her father is not an expert cook. At her home the household chores and take care of children are done by only females. However women participate in decision making process always.
Gender Discrimination	Her family did not associate certain careers with certain genders. Her family is educated and they never distinguish between professions. There is no restriction for female family members in doing e-commerce/online business. Rather they do not prefer women sitting at home/ housewives. Her family treats both male and female equally. Even her father encourages her to continue business. Her family is supportive to e-commerce knowing that this platform is increasing rapidly in Bangladesh and the business is convenient and less risky in terms of cost. Starting an online store was the most risky decision for her family to invest on as this was never been practiced before But her family trusted her and invested. Her husband is positive about her engagement with e-commerce as she does not need to go out of home. She is allowed to meet strangers for business purpose, but only females. Her family did not have enough knowledge about online business and showed a negative attitude initially. After her success in the business her family is very supportive to her profession.

Most of the respondents reported that both men and women share household chores in their family. “At times, my brother makes his own breakfast and my father helps in household chores,” described one respondent. Another one reported: “My father cleans home on Fridays. My mother always cooks because my father is not good at it.” Exception of sex role differences was found in case of only one respondent as she belonged to a conservative family. “At my home, only the women carry the household chores and take care of the children. However, the women always participate in decision making,” she said.

The family members of the respondents possess positive attitude about women’s engagement in e-commerce. As the respondents belong to liberal and educated families, they have full support from their families. “All women in my family [including me] are in business. In fact, my family does not prefer women sitting at home as housewives,” one respondent stated. Another respondent narrated: “Starting an online store was the most risky decision for my family to invest in as this has never been practiced before. But my family trusted me and invested.” All respondents reported that their family members were satisfied in the fact that they all were now independent women.

Women Empowerment through ICT

Respondents reported that when they saw young women running online clothing stores profitably and that the stores could be operated from home, it motivated them to start their own online clothing stores. For the upcoming designers, their passion for fashion and designing motivated them to start online clothing stores. Housewives wanted to earn some money so that they could contribute to the household expenditures. Since e-commerce gives them the flexibility to work from home as well as earn extra money, they chose the profession. Also considering the heavy traffic in Dhaka city, one respondent was motivated to start an online shop. “I knew that given the traffic in this city, window shopping is too hectic for me and anyone I knew. If I created a platform for these customers where they could see products online and buy, I would be successful and I was,” she narrated.

Most of the respondents started it as a part time business but later they decided to make it their primary occupations because their stores had been doing extremely well and earning handsome profits. Housewives took up online clothes selling as their full time occupation. One respondent, who works for Banglalink, narrated: “Being a woman and living in Banglaldesh, I know that when I will be having a family of my own, I will have responsibilities which may become hard to accomplish by working in an office. At that time, having a business will be the best thing a woman can ask for.”

When asked about the benefits of using ICT in business, the respondents reported that ICTs provide faster service and wider customer reach. They can share their business page on Facebook among friends, relatives and potential customers. Moreover, they can advertise their online store via social media. Therefore, it reduced their marketing cost substantially. The high cost of setting up and

decorating a physical showroom was also put out of
the equation. They just needed to pay a minimum amount to the home delivery personnel instead of paying a fixed gross monthly salary to salespersons.

The respondents can also make important business decisions through social media. They can promote their own page by sharing pictures, ideas, news and information of upcoming designs. All respondents use social media for informing, raising awareness, showcasing their products, setting prices, and giving delivery information. They also offer sales promotions and discounts through Facebook. One respondent has a plan to promote her store through video advertisements on Facebook soon. Through Facebook, the respondents can even attract customers from outside the country. “It got me customers from around the country and even from abroad. I have foreign customers and also business partners,” another respondent narrated.

All respondents reported that their self-esteem improved when they found their store was doing well competitively. All of them are satisfied in the fact that they are now independent and can manage their own expenses. Besides monetary support, the respondents also earned fame through their online stores. “New media gave me a separate identity as a female entrepreneur and publicized my name” she narrated. Besides gaining in self esteem, the respondents were also able to strike a balance between their works and family lives. They are now able to allocate most of their time to their families as they are able to earn and manage household expenses and freely spend for their kids.

Growth Factors of Online Clothing Stores

When asked about the growth factor of online clothing stores, all respondents agreed on the point that they did not need to take the hassle of setting up physical stores. They can offer lower prices than the market prices because they do not need to pay for showroom rents, air conditioning, training employees, electronic machines and packaging. They just need to pay a minimum cost to the delivery personnel. “I sold designer outfits only on BDT 6,500 which was sold at BDT 9,500 in the shopping malls during Eid-ul-Adha,” she explained. All the respondents also agreed that the increased use of social networking sites expanded their business. A growing number of young adults use Facebook and Twitter now which actually helped these women to track down their perspective customers. Moreover, good word of mouth reviews from her social media friends help them to expand their businesses.

All respondents reported that the growth of mobile communication, especially the 3G services provided by the mobile phone companies led to the growth of the online retailing as people have greater round the clock access to the Internet. “This fosters the ease of getting connected with clients,” one respondent narrated. Another respondent described: “My customers can check my online page instantly whenever I upload a new catalog especially during festivals, boosting my sales.”

Matrix 4: Description of the Benefits Derived from the use of ICTs by respondents

Indicator	Description
Benefits of using ICT	It has saved time and money. It helps provide faster services She shares her online store on social networking sites among friends and relatives. Advertise online clothing store through social media to attract existing customers and reach new clients. Her cost of capital minimized since it is an online store, convenience and wide network. Whenever she launches something new she shares it on social media and potential customers contact her
Making business decisions using ICTs	She posts/shares pictures everyday on her Facebook wall. She uploads new catalogs/albums regularly. Paid advertisements on Facebook that helps her to spread her page Upload the pictures of models on Facebook wearing clothes of her online store Opening event page and offering sales and discounts through Facebook Social media got her customers from around the country and even from abroad. She has foreign customers and also business partners.
Improvement of self esteem	She can earn by herself and became an independent woman She can create her own identity with the help of new media. The rise of online media has publicized her name. When she sees her store is doing well in competition it boosts her self esteem She became known to people, earned good will and became stronger financially. This increases her confidence It increased my self esteem as people from different arena now know me as an entrepreneur
Work-life balance	Now she can do all household works, she can afford time to cook by herself, take care of babies as well as manage her own business. She is able to allocate most of her time to her family as well as she is earning and manage her own household expenses, spend for her kid.

Half of the respondents agreed that electronic
transactions made payments easier for their customers outside Dhaka. Also, payment became more convenient for foreign customers because of Internet banking. The banks are bringing out new guidelines (like one time passwords and security questions) so that the online transactions can be made safe for the customers. Others reported that their customers preferred to pay them through Bkash or payment on delivery.

When asked about the emergence of nuclear families as a growth factor for online clothing stores, most of the respondents agreed that in the present era, nuclear families are increasing and both husband and wife are working. They have less time to go to the markets for purchasing commodities and therefore they prefer online shopping. They also pointed out that in nuclear families people prefer to spend more for themselves i.e. for clothing, make-up and accessories.

Bangladeshis living abroad boost the growth of online shopping significantly. The respondents have customers from India, Pakistan, Dubai, Australia, UK and even from Spain and New Zealand. According to the respondents, when Bangladeshis living abroad buy traditional clothes, they are ready to pay high prices. On the other hand, these customers can get gorgeous traditional clothes from online boutiques at reasonable prices. One respondent reported that 60% of her customers live abroad. Another respondent reported that during last Eid, she sold clothes worth nearly BDT 1 lac to customers living abroad.

Challenges/Barriers to Online Clothing Stores

When asked about the challenges and barriers of maintaining an online clothing store, the respondents identified unavailability of Internet access. Six respondents reported that in some areas the broadband connection was slow. “No Net, No Business,” one respondent said. Also they are unable to contact with their customers when electricity goes off. However, four respondents said they were always connected with the Internet using wifi and 3G.

The second barrier that the respondents identified was the absence of “touch-feel-try” experience. Customers prefer to touch and see the product before buying. Customers often say: “It looks like it is of my size but what if it does not fit well,” one respondent said. Therefore, the fact that online stores cannot offer the facility of “touch-feel-try” is a barrier.

The respondents did not see the untimely delivery of products as a barrier in their business. Seven respondents reported that they tried to deliver their products within 24 hours. Another respondent reported that she delivered her products in nine days. Two respondents reported that because of the recent political unrest in the country and the agitation programs like hartals (general strikes) and blockades, she failed to deliver her products on time. As a result, a customer got mad with her which hampered her reputation.

Matrix 5: Description of Growth Factors of Online Clothing Stores by Respondents

Factor	Description
Best Price with Better Bargains	She can offer lower price as she has no physical show room. She does not need to pay for rent and employee salary. She just pays a minimum cost to delivery boy. She keeps her profit margin flexible as she does not need to pay for a showroom. She can compare her price with other online stores and can place a competitive price
Latest Trend of Social Networking	As the growing number of young adults use Facebook and Twitter, this actually helped her to track down her perspective customers. Social media expands her business by sharing her page by her friends and relatives. Good word of mouth reviews from her social media friends helps her to get customers.
Rise of 3G and Mobile Technology	This fosters the ease of getting connected with clients It helps her to view customer requests anytime and anywhere. Her customers can check her online page instantly whenever she uploads a new catalog especially during festivals.
Increased Use of Net Banking/ Credit/ Debit Cards	Her clients outside Dhaka pay her through net banking. This makes transaction more flexible. Mode of payment have become more convenient for foreign customers Most of her customers pay her through Bkash or payment on delivery.
Emergence of Nuclear Family	In today's capitalistic economy people are materialistic and they are willing to spend more on themselves i.e. clothing, make-up and accessories. In nuclear families where both husband and wife works, they have less time to go to the market for purchasing commodities, they prefer online shopping.
Online Shopping Attraction for Bangladeshi's Living Abroad	When they buy traditional clothes abroad, it is very costly. They can get gorgeous traditional clothes from online boutiques in a reasonable price. She takes order from abroad send it via DHL (courier service) to her customers. She has 60% customers who live abroad. It added benefits to her business. She sends dresses all over the world. During Eid she sold clothes worth Taka 1 lac almost.

Matrix 6: Description of Challenges and Barriers of Online Clothing Stores by Respondents

Factor	Description
Unavailability of Internet Access	The situation is changing now. People are connected with online through broadband, wi-fi and 3G connections. She believes modems and broadband speeds are not fast enough in some area. Also when electricity goes off, she is unable to access online.
Absence of 'touch-feel-try' Experience	This is a big challenge. Customers prefer to see the product before buying. So she tries to explain the features of her products to her customers. Her customers can come to her place and she displays her product before sell. Her customers also try the dresses before buying.
Untimely Delivery of Products	She always delivers her products within 24 hours. She always delivers her products within 9 days. Now she faces it due to current political situation in the country
Lack of Trust between Buyer and Seller	Her customers always trust her as she sells quality products She takes 50% before taking orders. Sometimes people order a dress but they do not pick it later. Since the buyer can not see her, often the buyer doesn't trust about the product quality.
Offline Presence	Her customers can always contact her over phone and meet her in person before buying a product.
Cyber Crimes	She is afraid of being her Facebook page hacked as it will hamper her reputation. Now-a-days Facebook is not secured. Online payment is little bit risky as cyber crime is increasing day by day. She is afraid that others may steal/copy her designs. She is not aware of cyber crime.

When asked about the lack of trust between buyers and sellers, the respondents reported that they sold quality products to their customers and that was why they had always been trusted. One respondent reported that she took 50% payment before taking orders because some customers cancel orders. Sometimes the customers are not sure about the quality of the product unless it was delivered to them.

When asked about offline presence, the respondents reported that customers should be assured that online retailers are not only available online but offline as well. Therefore, the respondents always contact with their customers over the phone and meet them in person whenever they want. This gives the customers a psychological comfort that these online clothing stores can be relied upon.

Lastly, when asked about cybercrime as a barrier to online clothing stores, the respondents reported that they are afraid that the information on their Facebook pages may get distorted and that will hamper their reputations. Also, two respondents are afraid that others will copy their designs. One respondent thinks online payment is risky as cybercrime is rising. However, two respondents reported that they were not aware of cybercrime.

Strategies Adopted to Attract Customers Online

The respondents explained the effective strategies they adopted to attract customers online. Most common responses are unique designs, free home delivery within 24 hours, offering lower price than showrooms and answering queries the soonest. Two respondents reported that they offered festival discounts during Eid, Valentine's Day and New Year. One respondent uses a unique idea to attract customers. "I award 'client of the month' to one customer depending on her frequency of purchase at my store and offer her discount," she narrated.

The respondents are also engaged in several kinds of promotional and marketing activities to attract customers. All the respondents promote their stores through their Facebook fan pages. Two respondents promoted their stores through paid advertisement on Facebook. Five respondents reported that they offer summer sale and year end sale to promote their stores. The common marketing tools used by the respondents are: uploading customers' pictures wearing the outfits of the particular showroom, using of attractive packets and visiting cards, sharing e-flyers and e-posters on social media and participating in exhibitions and fairs before festivals.

Matrix 7: Description of Strategies Adopted to Attract Customers Online by respondents

Factor	Indicator
Effective Strategies	Unique designs Free/prompt home delivery Offering festival discount Lower price than showrooms Client of the month Answering queries asap
Promotional Tools	Opening Facebook fan page Paid advertisements on Facebook Summer sale and year end sale
Marketing Tools	Uploading customer's pictures wearing the clothes Usage of attractive packets and visiting cards Sharing e-flyers and e-posters on social media Participating in exhibitions/fairs

Summary and Conclusion

The paper basically looked at the factors that motivated Bangladeshi women to start online clothing stores through social media. At the same time, this paper investigated the challenges and barriers of maintaining online clothing stores. Based on the study, the following are some of the main findings:

* Most of the respondents own laptops, tablets, ipads and iphone and have broadband and wifi Internet connection at home.

* They use computer and Internet for various purposes including social networking, online shopping and e-commerce.

* They have full social support for using ICT.

* Most of the respondents belong to families that are modern and liberal and do not associate certain professions with certain genders.

* In most families, household chores are shared by men and women although there are exceptions.

* In all families, women participate in decision making and opinion sharing as the families see men and women as equals.

* They use social media to promote their pages by sharing pictures, ideas, news and information about upcoming designs.

* Their businesses fetched them both money and fame. These women are now independent and possess high self-esteem.

* The respondents are able to strike a balance between work and life because they can handle their businesses from home.

* Respondents can offer products at cheaper prices than market as they do not need to bear the cost of setting up a showroom.

* The rise of 3G mobile Internet enabled customers to check online pages instantly whenever a new catalog is updated, boosting sales.

* Increased use of Internet banking made payment easier for customers abroad.

* The emergence of nuclear families had led to the growth of online shopping stores as in these families, both the husband and the wife work and therefore have less time to go to window shopping. Hence they prefer shopping online.

* Bangladeshis living abroad buy a substantial amount of clothes from these online stores.

* The respondents see unavailability of Internet connection as a barrier as broadband speeds are not fast enough in all areas and they are unable to use Internet when electricity goes off.

* Absence of “touch-feel-try” experience is a big challenge as customers prefer to see the product before buying.

* The respondents do not see offline presence as a barrier to their business because their customers can contact them over phone and meet them in person before buying a product.

* The respondents see cybercrime as a barrier to their business as they are afraid that their Facebook pages may be hacked, which may hamper their reputations. Also, they apprehend that their designs may be stolen.

* Free home delivery, lower prices than showrooms, festival discounts, summer sales and year-end sales, paid advertising on Facebook and usage of attractive packets are the most common marketing and promotional tools used by the respondents.

Compared to countries like the United States of America, Canada, the United Kingdom and Australia, Bangladesh is still at the embryonic stage of e-shopping. Though online shopping has witnessed growth in Bangladesh, it is still not as pervasive as it is in the west. E-retailing in Bangladesh can be a success if the e-retailers serve their customers properly through e-mail, chat and mobile phones.

The online stores should ensure that the customers have the right information and mechanism and feel safe and secure while transacting online.

At present, researchers are focusing on the e-commerce and m-commerce industries in Bangladesh, environment of e-commerce in Bangladesh and developing online shopping habits among Bangladeshis. However, none of these papers has a gender perspective. They overlooked women’s empowerment through technology and social media. It is hoped that this study will draw attention to how social media has changed traditional gender roles and encourage women, who are lagging behind in terms of economic empowerment because of their household responsibilities.

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Attracting and Keeping Bangladeshi Women in the ICT Profession

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Abstract

Bangladesh is all set to become the next global ICT hub. For this to happen, it requires more women to participate in the sector in order to maintain its competitive edge in terms of a young, driven and relatively cheap workforce. However, this is easier said than done in light of the negative perceptions of Bangladeshi women against the ICT sector. By examining the cases of female students and professionals in the ICT sector, the paper sought to find out the factors that would attract local women to prepare for and join the profession. It also explored the circumstances that would enable Bangladeshi women to remain and prosper in the said sector.

Introduction

Bangladesh appears all set to become the next Information and Communication Technology (ICT) hub. In recent years, it has attracted global ICT companies such as Samsung and Advanced Micro Devices (AMD) which have established their Research and Development (R&D) centers. Gartner, a technology research house, has included the country in the top 30 outsourcing destinations in a 2010

Keywords

ICT Profession, Women, ICT Hub

report (Mashroor, 2013: 1) According to the Bangladesh Association for Software and Information Services (BASIS), the software market in the country has grown by more than 50 percent in the last two fiscal years. The export of software products may even exceed USD 100 million next year (Huda, 2013: 1).

There are more than 150 registered companies in Bangladesh that export software products, mainly mobile application solutions and IT-enabled services (ITES). Moreover, an estimated 75 freelance software developers are operating in the country. Tandon (2006: 34) has estimated that the IT industry in the country has been growing at an average of 20 percent per annum for the past seven years. Apparently, the country is experiencing a third wave of IT outsourcing. The first wave was in consumer electronics while the second wave was on auto components, pharmaceutical and telecom equipment. The third wave of outsourcing comprises running call centers, payroll processing, data entry, software engineering and research and development.

BASIS has projected a tripling of current export performance in the near future if sufficient telecommunication infrastructure is provided. In a dialogue held in September 2012, stakeholders discussed the infrastructure needed for making Chittagong city the next ICT hub. Participants are initially focusing on developing mail servers and database servers. Later, they plan to establish a data center and data park. For BASIS, Bangladesh has comparative advantages to take a bigger slice of the global IT/ITES market. The country has abundant young and trainable labor, low IT/ITES labor costs, supportive government for digital initiatives and an active industry association.

The Bangladesh government, in line with this, has viewed ICT development as an engine for economic growth, particularly in the manufacturing and service industries (Tandon, 2006: 34). It plans to establish high tech zones and a software technology park with dedicated data communication facilities. The Bangladesh Telecommunication Regulatory Commission's latest National Media Survey placed the total Internet users in Bangladesh at 30.48 million as of January 2013; Internet penetration stood at 20.3 percent. The main Internet connection types are: 94 percent mobile Internet, 4 percent Internet Service Provider (ISP) and 2 percent WIMAX. The Facebook population in Bangladesh is now 3.39 million; 78.7 percent of which are male and 21.1 percent are female. Facebook adds one new user from the country every 20 seconds. The table below illustrates the purpose of Internet use in the country.

Labor Needed by ICT Sector

As a result of these developments, there is a growing demand for ICT workers in the country. According to Tandon (2006: 22), the types of ICT jobs desperately needed in the country are mainly associated with ICT programming and applications, ICT platforms to support enterprises and ICT manufacturing, servicing and repairing. The matrices below show the shifts in the types of ICT job vacancies and qualifications in 2004 and 2013 as shown in the top leading newspapers.

Table 1: Purpose of Using Internet in Bangladesh

Purpose	Percentage
Downloading	74.2
Social Networking	67.0
Emailing	61.3
Chatting	54.6
Education Related	24.7
News Related	22.1
Youtube	20.6
Job Related	18.6
General Surfing	8.2
Net-to-Phone	4.4
Others	0.7

Source: Bangladesh Telecommunication Regulatory Commission (2012).

Matrix 1: Shifts in Types of ICT Job Vacancies and Qualifications in Bangladesh

Year	Job Type	Educational Qualifications
2004	System Analyst, Software Engineer, Hardware Engineer, Consumer Service Engineer, Web Developer, Network Engineer, Teacher, GIS Developer, Programmer, Chief Technical Officer	B.Sc in Computer Science/ICT/ Electrical and Electronics M.Sc in Physics/Computer Science
2013	Web Solution Developer, Data Comptroller Supervisor, Data Entry Operator, Computer Operator, Professors, Lecturers, IT Specialists, IT Support Officer, IT Consultant, Internet/Computer Service Officer, MIS Officer	Higher Secondary Education (HSC) Diploma in Computer Science and Technology Honours in any discipline/ Computer Science/Engineering/Technical M.Sc or Ph.D. in any discipline/ Mphil/Computer Science

Source: 2004 Data from the International Telecommunication Union (ITU) December 2004 Report titled: Trend and Status of Gender Perspectives in ICT Sector: Case Studies in Asia-Pacific Countries. 2013 Data from daily Prothom Alo and the Daily Star newspapers taken from April to May 2013.

Although a more comprehensive data collection is needed to ascertain definite trends, Matrix 1 seems to affirm the above-mentioned discussions relating to the shift in ICT jobs from being more technical/engineering to those demanded in ICT outsourcing such as data entry, call centers, etc. In the same way, the educational qualifications have moved from technical/computer/engineering degrees to more general and diploma degrees. In both time periods, there were demands for teachers in private and public universities offering computer, engineering and technical degrees.

One major cause of concern regarding the fulfillment of this ICT hub aspiration relates to the country's workforce. Tandon (2006: 21) "estimated that the labor force is growing at almost twice the rate of the population growth, and this relationship is likely to remain unchanged for the next two decades or more as a direct result of the changing demographic dynamics." The decelerating population growth, however, may be more than offset by increased participation rates of women. But, the questions are: firstly, are Bangladeshi women attracted to ICT profession; and secondly, for those women who study ICT, would they enter and remain in the said profession given family and work pressures?

The plan to make Bangladesh an ICT hub is thus dependent on its female population. Tandon (2006: 5) explains that the government needs to implement "effective, pro-active and deliberate policies that push for the social inclusion of women in all spheres of economic and social activity and decision-making."

Women in ICT Sector

Across the world, women have been reported to be under-represented in the ICT sector (Genilo, 2012: 62). This under-representation not only includes women professionals but also students in vocational and tertiary schools. Given worrying trends, the World Congress on Information Technology (WCIT) held in Montreal in October 2012 focused on attracting women into the ICT sector and retaining them.

In Bangladesh, Wangmo, Violina and Haque (2004: 81) indicated that very few women enroll in computer science and engineering undergraduate and graduate courses in the public universities in the country. In vocational schools offering ICT training, they observed a similar pattern – more male students. Given the situation where few women study ICT, they expected only a few women to become employees or entrepreneurs in the ICT sector. "Even if academically fit for posts, female applicants in many instances voluntarily give up their interest for application for the job because other non-academic requirements do not fit with them," they stated.

Islam (2012: 2) concurred that "there are no reliable statistics on women's use of ICT in Bangladesh but it is clear that the numbers are small. Most women who use information technology use it at work. Except in upper income enclaves, access to a computer or the Internet at home is not a typical phenomenon." For him, many factors affect the digital inclusion of women such as literacy and education, language, time, cost, geographical location of facilities, social and cultural norms, and women's computer and information search and dissemination skills.

Gender Issues and the ICT Sector

Owing to the need for more women to participate in the ICT sector, female entrepreneurs, corporate executives and computer professionals established the Bangladesh Women in Technology (BWIT) in 2010. The organization aims to empower women with technology in order to build a critical mass of women ICT workers in Bangladesh – enabling the country to become the next Silicon Valley, Seoul, Boston or Bangalore. According to BWIT officials, there are two mindsets

that need to be countered for women in the country to join the sector. The first is the mindset of parents who believe that "girls are not meant for tough tasks and challenging jobs" (Daily Star, March 8, 2011). Parents also say that girls are not supposed to be good at subjects such as science, mathematics and technology. Hence, when pursuing higher education, many of them discourage their daughters from taking technological subjects. Freris (2012: 1) agreed, stating that "one of the main barriers [for female participation in the sector] is the mindset of families. They have a negative perception that the ICT industry is not offering suitable jobs for women."

But, it is not only parents who hold such a perception. Wangmo, Violina and Haque (2004: 81) added that admission requirements of some public universities disfavor women to get admission in ICT-related disciplines given the belief that women are not good in math and science. BWIT officials added that girls are not informed about prospective professional careers by their teachers. They are not given information about subject prospects, especially about information technology. The mindset is that women should have jobs such as teachers or artists. Women can also become economists, entrepreneurs, political analysts and linguists but not scientists and technologists.

The second mindset that needs breaking, according to BWIT officials is that "IT is male-dominated" (Daily Star, December 30, 2010). Many female IT graduates find it difficult to build a career because of social stereotypes. A macho culture exists in the IT sector. Such a culture is largely individualistic, competitive, authoritative, rational, hard skilled, tough, total commitment oriented and no private life. It is also characterized by quick feedback and high risk. Wangmo, Violina and Haque (2004: 83) explained the difficulty Bangladeshi female IT professionals encounter in a macho workplace. They narrated:

For example, a professional woman engineer who has to spend many hours for household activities (for example, rearing children, caring households etc.) cannot fulfill non-academic requirements like ability to work under pressure, ability to develop expertise within the shortest possible time and with minimum supervision. So, these kinds of requirements in effect, work as obstacles for entering women IT professional in IT related job market.

By the same token, Wangmo, Violina and Haque (2004: 82) contended that women IT professionals are discriminated upon in the country. Even if they enter the profession, they are likely to hold low positions doing word processing and data entry stuff. They will not be involved in programming and decision-making. Freris (2012: 1) added that "there is a lack of respect for women in the field. They continuously have to prove themselves to co-workers." In an informal survey she conducted among 45 female students in a private university, Freris found out that 71 percent did not find the ICT profession attractive. Students were also concerned about the demands of the job such as travelling far and late at night, harassment from co-workers and lack of child care support.

Nevertheless, Tandon (2006: 5) opined that social attitudes in the country are changing as more and more women take up new opportunities for economic and social development. For this reason, he expected more women to join the ICT profession as ICTs become more accessible to them.

Principal Research Question

The paper's principal research questions read: What are the factors that would attract Bangladeshi women to prepare for and join the ICT profession? What are the circumstances that would enable Bangladeshi women to remain and prosper in the said sector?

Component Research Questions. The paper investigated how Bangladeshi women preparing for and working in the ICT professions are able to successfully navigate a field that is male-dominated and discriminatory against women. It looked for inspiration in the lives of five students and five career women who have achieved success in the field. It uses a life cycle perspective and utilizes as guide concepts relating to social exclusion. The research question will be sub-divided into the following components:

1. How these women surmounted digital exclusion in terms of availability/ownership of a device, connecting/access of the device to Internet on a regular basis, computer literacy, ability to read or write in the international language, social support in online networks and quality of ICT usage (which enable participation in key activities in society).

2. How these women became attracted to prepare for and join the ICT profession in spite of gender stereotypes, gender bias, sex role socialization and general discrimination against women.

3. How these women at various stages of their life cycle remained in the ICT sector from schooling, transitioning to further learning, early employment, marriage, motherhood, return to the labor market and career progression.

4. How these women grew and prospered in the ICT sector in spite of workplace culture characterized by machismo, feeling of isolation, extreme work pressure, unclear career path, glass ceiling phenomenon and ageism.

Related Literature

The proposed paper takes off from the prior work of the principal author and from studies from Bangladeshi and foreign authors with research interests in ICT profession, social inclusion and women. The principal author has written papers on ICT policy titled "Narratives on Digital Bangladesh: Shared Meanings, Shared Concerns" (presented in CPR south 4 conference in 2009) and Digital Inclusion: Constructions of ICT Award Giving Bodies" (published in ICT for Development Working Paper Series in June 2012). In the December 2012 issue of the ICT for Development Working Paper Series, he wrote a paper on "Exploring the Social

Exclusion of Women in the ICT Sector." He presented global data relating to the under-representation of women in the ICT profession – whether at the entry level or managerial level. He likewise surveyed various literatures in an effort to explore the reasons behind such under-representation.

Reviewed materials may be classified into two basic clusters. The first cluster illustrated the extent to which women are under-represented in the ICT sector in terms of study or employment. James (2006), in looking at the South African situation, showed that only about 20 percent of the current ICT workforce is female. Castano and Webster (2011), on the other hand, pointed out that women made up less than 25 percent of ICT specialists in the United States, 20 percent in northern Europe and 10 to 15 percent elsewhere. Gras-Velazquez, Joyce and Debry (2009) cited similar statistics in Organization and Economic Cooperation and Development (OECD). Servon (2008) attempted to explain the under-representation of women by characterizing the science, engineering and technology work culture as macho where women experience extreme work pressure, feelings of isolation, mysterious career paths and systems of risk and rewards.

In terms of female representation in ICT education, Palmen (2010) presented data showing more male students sitting in ICT-related examinations in the United Kingdom in 2005 and 2010. Kirkup (2010), as opposed, reported the under-representation of women in vocational training and academic programs leading to ICT careers in advanced countries like the UK, Germany and Japan. In the US, Cohoon (2010) revealed that only 13 percent of female students in 2009 intended for a computing major in college. Alarmingly, the number has decreased from a 28 percent high in 1995. Omamo, Abagi and Sifuna (2005) pointed to socialization as the reason for this. Socialization may be defined as the learning of male and female roles from infancy. They mentioned several reasons as to why this occurs in Kenya. One of the reasons is that parents discourage their daughters to pursue ICT courses as they are expensive.

The second cluster of reviewed literature spoke about the social or digital exclusion of women. DiMaggio and Hargittai (2001) spelled out five dimensions of digital inequality – in equipment, autonomy of use, skill, social support and the purposes for which the technology is applied. Women suffer from digital inequality in these five areas. Husing and Selhofer (2002), on the other hand, developed a measurement of digital inequality called the Digital Divide Index (DDIX). After measuring social inequalities in European ICT adoption, they concluded high risks groups for gender (women), age (50 years and older), education (low education group) and income (low income group).

Chen and Wellman (2004) examined the digital divide in terms of access and use of the Internet across eight developed and developing countries: the United States, the United Kingdom, Germany, Italy, Japan, the Republic of Korea, China and Mexico. They found out that in these countries, men are more likely than women to have access and to use the Internet. Khan and Whalley (2012)

surveyed the digital connectivity of Pakistanis living in the cities of Karachi, Lahore and Quetta. They discovered that, compared with men, women spend less time on the Internet. Only 28.6 percent of women considered themselves to be heavy Internet users – compared to 72.0 percent men.

In Bangladesh, there were three major researches relating to the present paper. Wangmo, Violina and Haque (2004) reported about the trends and status of gender in the ICT sector in Bhutan, Bangladesh and Indonesia. Tandon (2006), similarly, showed the trends, opportunities and options for women ICT workers in Bangladesh; explaining emerging opportunities and issues of a knowledge economy. In both studies, the authors identified Bangladesh's lack of a gender perspective in the National ICT policy and the under-representation of women in ICT education and profession.

The third study was conducted by Ahmed, Islam, Hasan and Rahman in 2012. They developed an index called the "women's informatization indicator," which measures the impact of ICT on women in Bangladesh. The protocol refers to the use, exchange and production of information and knowledge utilizing ICT to advance women's statuses and the quality of their lives. The 11 indicators include: women's psychological resistance, women's attitude towards other women, family constraints, religious zealotry, gender gap, access, social violence response, social acceptance, empowerment, education and men's attitude towards women.

Study Framework

For its study framework, the paper utilized the life cycle perspective (as opposed to the leaky pipe approach) in studying women's career progression in the ICT sector. The pipeline is considered to be a metaphor illustrating that women leak away from the profession at certain junctures in time. Since women continuous leak away, very few of them end up occupying managerial positions. For Castano and Webster (2011: 368), the leaky pipeline approach "makes no provision for alternative educational and career pathways." It also fails to recognize the social, political and cultural factors influencing women in making career decisions. The life cycle perspective, on the other hand, brings forward the sequencing of stages in an individual's life, which moves along differing pathways. A person experiences transitions, trajectories, life events and turning points in their life courses. Castano and Webster (2011: 370) explained that:

"'transitions' are changes in roles and statuses experienced by individual women or men; 'trajectories' are long-term patterns of stability and change that involve multiple transitions in an individual's life; 'life events' are significant occurrences involving relatively abrupt change that may produce serious long lasting events in an individual's life; and 'turning points' are a substantial change or discontinuity in direction that is not temporary, but lasting."

Servon (2008) identified the characteristics of the workplace culture in the ICT sector, which may impact women's transitions, trajectories, life events and turning points. Since the ICT sector is characterized by a macho culture, it subjects

women to experience extreme work pressure, feelings of isolation, mysterious or unclear career paths and systems of risk and rewards.

As the discrimination against women in the sector can be considered digital exclusion, the paper identified the various types of digital inclusion/exclusion – into/from access, connectivity, ability to use and quality of use. Mancinelli (2007: 7) identified digital exclusion as a manifestation of social exclusion. For her, "the digital divide is basically about social access to digital technologies" as it "considers social relation around the uses of ICT." She (2007: 7) described three types of digital divides: (1) access divide (those with and without access to ICT); (2) usage divide (those who use and do not use ICT); and (3) quality of use divide (difference in usage by users).

Method and Design

The present paper found inspiration from Omamo, Abagi and Sifuna (2005) who followed the journey of successful professional women in the ICT sector in Kenya. The present paper's design is exploratory, qualitative and descriptive. It utilized primary and secondary data. Primary data came from in-depth interviews of Bangladeshi women, who successfully navigated the ICT sector to be able to study, join, remain and prosper. The selection of respondents was purposeful – five students, five professionals, two owners/entrepreneurs and one ICT human resource manager. Qualitative data was analyzed using an analytical deductive method and presented using matrices. Secondary sources included past papers, documents, job advertisements and reports on ICT, education and women in Bangladesh.

Research Findings

The section was divided into the following: Digital Inclusion/Exclusion, ICT Field Attraction, Gender Upbringing, Job and Family Life Cycle Experiences and Work Place Culture. The section presented first the description of students, followed by professional and owner/entrepreneurs/human resource managers.

Digital Inclusion/Exclusion Indicators

The study conducted in-depth interviews with five students taking up computer science and engineering at public (Dhaka University) and private (University of Liberal Arts Bangladesh) universities. The respondents were affluent as their parents could afford to send them to tertiary education and/or to buy computer devices (desktop, laptop or tablet) and Internet connection. They were aged from 18 to 23 and all of them belonged were Muslims. The students first described their access to computers/Internet, followed by literacy in computer and language. Lastly, they explained the quality of ICT use.

In terms of computer access, all respondents had early access. One student even had her first experience using a computer in Grade 1 as her school had a computer laboratory and computer education. The other three respondents had their first experience of using a computer in upper primary education – Grade 5 and above.

One respondent had her first experience quite late, i.e., during her Secondary School Certificate (SSC). "When I used the Internet for the first time at age 17, I thought it was interesting and felt very much excited," she narrated.

Matrix 2: Description of Computer/Internet Access by Student Respondents

Indicators	Description
Access to Computer	Primary school (Grade 1) had a computer laboratory and taught computer education. Her parents gave her a laptop computer in Grade 3. She started using computers in Grade 5 in school. She started owning a personal computer after finishing higher secondary education. She has access to both a desktop and laptop computer but uses the desktop more. She first started using the computer in Grade 8. She got her own computer when she entered the university. She has a laptop.
Access to Internet	Her laptop computer was connected to the Internet at Grade 7. She has WIFI connection at home. She got access to the Internet in Grade 5. Now, she has a Qubee (a broadband Internet Service Provider that uses WIMAX technology) connection. She started accessing Internet when she entered the university. She has broadband connection in school and at home. She has broadband connection at the university and has a dial-up connection at home. She uses mobile internet in her tablet.

During the interviews, all respondents claimed that they owned a computer and had Internet connection upon entering university. Previous to that, they had access to computer and Internet at home and in school but had to share with others. The respondents own either a desktop or a laptop computer or both. One even has a tablet. As for Internet connection, they have WIMAX or dial up connection at home. In school, they have WIFI and broadband connection.

In terms of language literacy, four respondents claimed to be very proficient in Bangla. Only one mentioned difficulty in navigating the Internet in Bangla as she studied in English medium schools. As for English, four respondents are confident with their proficiency while one experiences hardship in navigating the Internet in the said language. But, all respondents are computer literate as they had computer education at an early age. They have knowledge of different computer skills and applications such as MS Office, instant messaging, e-mail, Internet browsing, social media, blogging and Youtube.

Matrix 3: Description of Computer/Language Literacy by Student Respondents

Indicators	Description
Bangla Proficiency	Since she studied in English medium schools throughout her life, she is not that confident about navigating the Internet using Bangla. She is proficient in using Bijoy keyboard. She is good in navigating the Internet in Bangla. She is very proficient in Bangla. She has no problem navigating the Internet with her current knowledge of Bangla.
English Proficiency	She studied in English medium primary, secondary and collegiate schools. She has high proficiency in English. She has adequate English proficiency to navigate the Internet. She learned English on her own. She has difficulty with English and finds it hard to navigate the Internet because of this deficiency.
Computer Literacy	Having taken computer classes since Grade 1, she is very computer literate. She has the following computer skills – MS Office, instant messaging, e-mail, internet browsing, social media and Youtube. She has the basic computer skills. She does not blog and use instant messaging. She knows various computer applications. She does instant messaging, blogging, emailing, social media and youtube.

Matrix 4: Description of Quality of Use by Student Respondents

Indicators	Description
Purpose of ICT Use	She uses the Internet for study purposes, especially since she took Computer Science Engineering. She also uses ICT for entertainment and social networking. She uses ICT for studying, entertainment, social networking, learning current events and online shopping.
Social Support for ICT Use	She has full support of family, relatives and friends in using ICT. She is able to communicate with relatives in Chittagong. She has many friends, who use the Internet. She has the support of her family and relatives in using ICT. Her parents gave her a desktop computer while a relative brought her a laptop computer. Her family is glad that she uses the Internet on a regular basis. They stay connected because of the Internet.

All respondents use the computer and Internet mostly for study purposes. As they are taking computer science and engineering, they need the device for doing programming assignments and other related work. However, they also use ICT for entertainment and social networking. One even goes online to shop and to know current events. All respondents have social support for their ICT use. Their parents or relatives bought them their computer devices and paid for their Internet connection. A lot of their relatives and friends use ICT as well. For this reason, the respondents go online everyday to stay connected with them.

Matrix 5: Description of Attraction to ICT Profession by Student Respondents

Indicator	Description
Role Model	She sees Bill Gates and Steve Jobs as persons who inspired her to pursue a career in ICT. She thinks that the world is now technological and she wants to be a part of it. She was inspired by Bill Gates, Steve Jobs and Dennis Ritchie. She is fascinated by the fast pace of development in the ICT industry and the new models that come into the market. Her teachers in high school encouraged her towards an ICT career. She was inspired by Steve Jobs and by her teachers in high school. She is attracted to ICT because it is fun. Also, society has already turned to digital technologies.
Career Decision Maker	She was given full freedom by her parents to choose her career. Her parents gave her advice. The opinions of her father and mother are equally important. She makes her own decisions but with consent from her parents. She is not restrained by her family to explore the outside world and mingle with strangers. They are not conservative. It is her decision to take a degree in ICT. Her family is positive about women being educated in society in the same level as men. She was left to decide about her educational degree.
Support for ICT Education	Her parents encouraged her to study ICT. But, it was her decision to study this field as she wants to be involved in technological advancements. Her family is happy with her decision to study computer science and engineering. Initially, her parents wanted her to study pharmacy. Her parents did not protest when she decided her field of study. Her family supported her decision to study ICT.

Attraction to the ICT Field

All student respondents expressed that they were naturally attracted to technology and the ICT profession. One stated: "I found ICT fun and our society has become very digital." Another mentioned: "The world is advancing because of technology. New inventions are made every day. I want to be part of this world of technology." As to role models, three respondents mentioned well-known IT personalities such as Steve Jobs, Bill Gates and Dennis Ritchie. Two respondents mentioned their high school teachers as role models.

Professional respondents also claimed to be inclined towards technology. One admitted finding "the ICT field more interesting than others." Another professional respondent saw the opportunity for career growth in ICT, stating that "computers and technology is by no means a mature market. It is evolving. Therefore, there are many opportunities for advancement in ICT." Two respondents had as role models people they were close to – grandfather and brother. They wanted to follow in their footsteps. The other respondents had no role model.

Matrix 6: Description of Attraction to ICT Profession by Professional Respondents

Indicator	Description
Role Model	Her maternal grandfather was her role model. He studied engineering. He made her realize the promises of the ICT sector. She did not have any role model. She is naturally attracted to new technologies. She chose the ICT field because it is not a mature field. There are lots of opportunities. Her brother was her role model. He studied engineering. Her parents encouraged her to follow in her brother's footsteps.
Career Decision Maker	Her mother influenced her to take ICT given that her grandfather is a successful engineer. Also, they believe that career progression will be fast if in the ICT sector. She found the field most interesting. Her family allowed her to choose her own career. Her family is broadminded enough to allow this. At first, her parents wanted her to be a doctor but they did not force it on her. Her parents make all the decisions. She simply follows and participates when requested. But, her parents are liberal and do not discriminate according to gender.
Support for ICT Education	Her family supports her decision to study computer science. They influenced her to take it as well. It was her choice to study computer science and engineering. She got the full support of her family. Her parents are proud of her working in this field.

The five professional respondents had undergraduate degrees in Computer Science and Engineering from private and public universities. One respondent even had a Master's in Business Administration. Their ages range from 24 to 32. All of them are Muslims. While all of them were married, only three had children. They worked in established IT companies at positions such as software engineer, software developer, contact center specialist, data analyst and assistant director for training/implementation.

Noticeably, almost all student and professional respondents decided to study ICT on their own. Two respondents stated that their parents initially wanted them to prepare for another career such as medicine or pharmacy but these wishes were not forced on them. Only one had her parents deciding on her study field. The others were given freedom by their parents to select their undergraduate degree. All respondents expressed that their parents were positive about women being educated in society at the same level as men and their parents did not believe that ICT was a field exclusively for the male gender. Such being the case, their parents and relatives were supportive of their ICT education.

Gender Upbringing

Students and professional respondents stated that there was no gender discrimination at their home. "My family treats me as a human being rather than just a girl," one stated. "I did not feel any discrimination as a girl," another expressed. Basically, the respondents belong to households that are very liberal and modern given the following practices. First, both male and female family members participate in decision-making, both minor and major. Second, family

Matrix 7: Description of Gender Upbringing by Student Respondents

Indicator	Description
Gender Role	She did not feel any discrimination as a female. Her family fully supports her education. She is the eldest daughter. Her family treats her as a human being rather than just a girl. There is no gender role differentiation and discrimination at her home. There are no set of gender roles in her home. Her family believes that women should do the same things men do.
Gender Discrimination	Her parents believe that women are as capable as men when it comes to studying any subject. Women can do the same work as men. There is no gender discrimination in her family. There is no difference in study areas between men and women. Her family is very modern. They are highly educated. They think that boys and girls are equal.

members do not associate certain careers with certain genders. They believe that women can do the same work as men. Third, family members allow their children to select their own field of study and profession. Fourth, female family members are allowed to intermingle with other people in public. They are also permitted to meet and entertain strangers. Fifth, some of respondents had male members (father or brother) sharing household chores.

Job and Family Life Cycle Experiences

Professional respondents had various experiences in getting a job in the ICT sector. Three of them went through a rigorous selection process such as a five-stage interview and written examinations. One received a job offer after her internship. She explained: "My supervisor appreciated my dedication and commitment to the job." Another respondent received a job offer from a recruitment fair at her university.

The professional respondents have been working from two to twelve years. Basically, they love their jobs. They explained that apart from receiving a handsome salary, they saw a great future in the field – either in a higher position in the company or in establishing their own companies. They have ambitions to climb the corporate ladder and are preparing for this eventuality through training and higher education. Three respondents, however, are considering taking a break from their careers if the demand for motherhood becomes pressing. Nevertheless, once their children grow up, they plan to return to the ICT sector. "It would be a waste of my talent and skills if I do not get back to work," one confessed.

Matrix 8: Description of Gender Upbringing by Professional Respondents

Indicator	Description
Gender Role	There are no set gender roles at home. All female family members participate in decision making whether minor or major. Her father even cooks their meals from time to time. In her family, male and female members share household chores. The opinions of all members are listened to when making decisions.
Gender Discrimination	Her family did not associate certain careers with certain genders. All her siblings are free to study anything. There are no restrictions on the female family members. They can meet strangers. Engineering for them can be taken by both male and female. One of her sisters studies engineering and she computer science. There is no gender discrimination when it comes to study or exposure to the outside world. However, at home, female family members are expected to do 90 percent of the household work.

Matrix 9: Description of Job Life Cycle Experiences by Professional Respondents

Life Cycle	Description
Job Entry Experience	Job entry into the ICT sector was tough. She went through a five-stage interview process. She received her first job offer after a recruitment fair in her campus. Her responsibilities are to develop new iPhone software and improve on previous products. She joined the company after her internship. She showed dedication and commitment to her supervisor. Her first position was IT Service Desk Engineer. She got a job in a software company after taking an examination organized by the government. Her duty is to develop reports and forms for ERP software.
Career Progression	She has been in the company for four years as the assistant director for training. She manages nine people. She is very satisfied and finds it to be a great environment for women workers. She aspires to go up the ladder as a project manager. She loves her work. She receives a handsome salary and other benefits. She aspires to get promoted or establish her own company in the future. So, she is enhancing her skills and gaining more experiences. She believes that further education will be helpful in achieving career goals. She plans to learn more innovations in IT systems to make human life easier.
Return to Work After Break	If ever she takes a break from career to become a full time mother, she plans to come back. She enjoys working and it would be a waste of her talent and skills if she does not work. She might leave her job as the demands for motherhood become greater. However, once her children get admitted to school, they would no longer in need of her all day long. Then, she will return to work. Although her husband is supportive of her career, she thinks that she might leave the job after motherhood. But, she plans to return once her children are older.

When the respondents got married, they had greater responsibilities. They needed to manage their household and take care of their husbands. However, they did not find it difficult to balance career and marriage. They made it a point to explain to their husbands the pressures and commitments of their work. This way, their husbands understood their situation. Two of the three respondents with children are fortunate enough to have a supportive home environment. They have their parents and relatives to take care of the children; thus being able to cope up easily. One respondent, however, felt the pressure of balancing career and motherhood. She sought to cope up by doing some work at home and communicate with her colleagues over the phone.

Matrix 10: Description of Family Life Cycle Experiences by Professional Respondents

Indicator	Description
Marriage and Career	Her marriage did not have any effect on her career. She has no plans to leave her job. Her marriage did not result in any change as far as her career is concerned. Her husband also works in the ICT sector. He is very understanding and is very broadminded. However, she now has to hurry home so that she can spend more time with her husband. If work pressure becomes more intense, she will look for another job. After marriage, her responsibilities grew. It became more difficult to manage matters. But, she explains her work commitments to her husband so that he can understand her situation.
Motherhood and Career	She does not have any children at the moment. So, she is not aware of the difficulties of having children. However, she has no plans of leaving the job after having children. At the moment, she has a supportive environment. There are people to care for her children. But, she is willing to take a break from her career to be a full-time mother if needed. After having children, it became more difficult to work. She copes up by doing work at home while caring for the children. She also tries to manage her work over phone.

Work Place Culture

Professional respondents reported a more or less conducive workplace culture in their companies. Although they admitted to some machismo in the office, those too were tolerable and did not affect them greatly. Respondents likewise did not feel isolated as there were other female workers in the office. However, there was one who mentioned experiencing isolation for being a woman in a project team. “My male teammates communicate less with me. They cannot accept a woman as their colleague. My project manager did not discuss things openly with me. Often times, I did not know what was happening,” she narrated.

In terms of work pressure, most respondents stated that they can cope up with this. One even explained: “I enjoy my job more under pressure. I find pressure a challenge.” Another respondent confessed that “women are given less work in the office compared to men. Men think that women are less capable.” Respondents agreed that they should make their own career path. They must create their own career goals and work towards such goals. They have not experienced the glass ceiling phenomenon so far as their careers are still progressing.

The responses of owner and HR manager respondents may explain the experiences of professional respondents. Two respondents own a company – one engaged in software development and web solution and one in counseling,

Matrix 11: Description of Work Place Culture by Professional Respondents

Culture	Description
Machismo	There is some machismo in the office. But, they are not that much. Quite tolerable. Some male colleagues display such behavior but this does not affect her.
Feeling of Isolation	She does not feel isolated at the workplace as there are other female employees. She has experienced isolation for simply being a woman. In a past project, her male teammates communicated less with her. They could not accept a woman as a colleague. Her male project manager did not also discuss things openly with her.
Extreme Work Pressure	There is extreme work pressure. However, she enjoys her job more when under pressure. She finds this a challenge. She believes that women are given less work compared to men. Men think that women are less capable. She has experienced this at times.
Unclear Career Path	Her career path is clear. She takes all the training she needs in order to become a project manager. She believes that she is on the right path to achieving her goal. She creates her own career path. She does not find any obstacle to reaching her career goals at the moment.
Glass Ceiling Phenomenon	She is still moving up the ladder. So, she has not experienced this so far. She has not experienced this yet. In her company, some of the leaders are women. So, this phenomenon may not exist in her company.
Ageism	Most of the employees are young. So, it is hard to tell whether ageism exists in her company.

research and training. The HR manager works for a leading telecommunication company in the country.

Being women, they had experience being underestimated by clients and co-workers. One narrated: “Initially, customers were not confident that a woman was the head of the company.” Hence, she needed to gain their trust and prove that she was reliable. In this light, the respondents instituted policies to promote employee diversity and practices that contained gender stereotyping. They likewise eliminated possible feelings of isolation by employing a good number of female employees. In the telecommunication company, 50 percent of the management team members are women. It had likewise established a “women’s council” to ensure engagement and empowerment of women.

Matrix 12: Description of Work Place Culture by Owners and HR Manager Respondents

Culture	Description
Machismo	The company ensures employee diversity and promotes practices that will contain gender stereotyping. One approach is to have a management team consisting of 50 percent women. Competitiveness is highly valued. In her organization, equal opportunity is given regardless of gender, race, ethnicity and physical disability. All employees are encouraged to compete with each other. Customers initially were not confident that a woman was the head of the company. It was hard to impose that she was a reliable, trustworthy anc competent person in the IT sector. They think a woman works as a hobby more than a real job.
Feeling of Isolation	If you have a company with a high number of female employees, there will be no feeling of isolation. They also have a formal group for female employees called "Women's Council" to ensure engagement and empowerment of women. Women feel discriminated against by male colleagues as the latter misinterpret their competitiveness, especially when promotions or rewards are concerned. The company has 30 percent female staff. So, there is no isolation of women.
Extreme Work Pressure	The company formulated policies to ensure that work does not hamper employees' personal time. Through cross-functional teams and work distribution, they enable employees to maintain a healthy work-life balance. Women do not fear work pressure and can work longer. However, family obligations such as child care, household chores, socialization, etc. restrict their work time. Hence, the organization provides flexible work arrangements for women, especially when pregnant and when they have small children or elderly family members to look after. Flexibility of time is a very important point for women.
Unclear Career Path	The company is performance-driven. Career progression is a crucial element of the work culture. Employees are given roles depending on their performances and the entire system is transparent and fair. The fault here is the obsolete educational system. There is a discrepancy between knowledge and practice. So, employees struggle moving forward. It is a perpetual challenge. The key to success are one has to do things perfectly and focus on quality.

Culture	Description
Glass Ceiling Phenomenon	With a high number of women in management positions, it is clear that there are no obstacles in promoting female employees. Definitely, there is a glass ceiling if female employees severely lack negotiation skills, assertiveness and willingness to take risks with professionalism. Women should stop perceiving competitiveness as machismo. In Bangladesh, the perception is that women are better at managing the household than a business. Women have talent and there are many educated women. The only problem is that they do not know whether they can contribute to this sector.
Ageism	Since the company is performance-driven, age is not really seen as a factor. A young or old person can occupy a senior level position as long as the person is competent. Women are generally looked down upon. There is also age discrimination regardless of gender.

Respondents likewise realized that women have a lot of family obligations. They instituted policies on cross-functional teams, work distribution, flexible working time and special work arrangements for pregnant women and for women who have small children and elderly family members. They placed more emphasis on work performance and quality rather than time spent in the office. Regarding promotions, two respondents mentioned that since women are in management positions, female employees would not be discriminated in promotions. One respondent, however, explained that there would be a glass ceiling if the female employee lacks negotiation skills and willingness to take risks with professionalism.

Summary and Conclusion

The paper basically looked at the factors that attracted Bangladeshi women to prepare for and join the ICT profession. It likewise investigated the circumstances that would enable Bangladeshi women to remain and prosper in the said sector. From the interviews of students, professionals, owners and HR manager, the paper discovered the following that facilitated women's attraction to the sector:

* they were naturally inclined to computers and technology;
* they were exposed to computer education and Internet at an early age;
* they own a laptop, desktop or tablet and have Internet connection at home or in school;
* they can manage navigating the Internet in English and in Bangla;
* they possess computer skills (high computer literacy);

* they use computer and the Internet for a variety of purposes (relatively superior quality of ICT usage); and
* they have social support for ICT use.

The paper likewise found out the mindset of the families the respondents belonged to. These are as follows:

* they are given full freedom by their families to select their field of study;
* they belong to families that are liberal and modern as evidenced by participation of female members in decision-making, allowing female members to go out in public, permitting female members to meet strangers and male members sharing in household chores;
* they belong to families that do not associate certain careers with genders; and
* they belong to families that see men and women as equal.

Regarding job and family life cycle concerns, the paper realized the following:

* they got job offers through competitive selection process, through internship and/or job fairs;
* they are moving up in their careers (high job satisfaction);
* they can manage to balance marriage and work albeit with more responsibilities;
* they are considering taking a break in their careers if the demands for motherhood become pressing; and
* they are willing to go back to work once their children are old enough to fend for themselves.

The paper described the workplace culture and environment experienced by respondents as follows:

* they experienced some machismo but those were tolerable;
* they do not have feelings of isolation given the number of female employees in the company;
* they can take work pressure and decide on their career path; and
* they have not experienced the glass ceiling phenomenon as their companies are still growing and their careers progressing.

From the study findings, decision and policy makers in schools, government and private organizations can institute policies to attract and keep more Bangladeshi women in the ICT profession. It should be noted that social attitudes in the country are changing as more and more women take up new opportunities for economic and social development (Tandon, 2006:5). However, special attention must be given to the ICT sector, particularly in the light of the country's ambitions to be the next global ICT hub.

At the moment, there are three main published documents relating to creating a Digital Bangladesh: Digital Bangladesh Strategy in Action, National ICT Policy 2009, and Strategic Priorities of Digital Bangladesh. However, none of these documents have a gender perspective. "They overlooked the digital exclusion of women, gender inequality in ICT education and consequently, the under-representation of women in ICT professions," contended Wangmo, Violina and Haque (2004: 77). Hopefully, through the present study, the government will develop and adopt a gender-based strategy on attracting and keeping Bangladeshi women in the ICT profession.

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INTRODUCTION

Internet and mobile phone penetration has opened-up new horizons for ICT based services to benefit communities at the bottom of the pyramid. Primarily driven by donors, development agencies, local and international NGOs, civil society, mass media, these services have extended even to the rural areas. Telecenter networks, for example, have reached previously inaccessible places using nonprofit and for profit models.

Although a large amount of work has been done in using ICT for Development, there has been no conscious effort to explicitly capture these initiatives. Hence, there is a pressing need to document success stories, lesson learnt and shortcomings. There is a call to write case studies on projects, programs and policies in this regard. As knowledge has become central to development, it is timely to publish a journal that specializes on ICT for Development issues. Academicians, practitioners and researchers can use the journal as a reference point for their work. It will contribute a great deal to strengthen knowledge management. Simultaneously, it will also enable them to share their experiences, works and knowledge.

OBJECTIVES

The ultimate objective of the working paper series is to articulate, capture and document success stories, best practices, lessons learnt and shortcomings of ICT4D projects or researches in developing countries.

TOPICS:

Academics/researchers/practitioners are invited to submit their work that addresses issues related to adoption, diffusion, and implementation and monitoring/impact assessment of ICT for development projects in developing countries. In fact, ICT4D being a crosscutting issue the working paper series will feature writing from almost any sectors or area namely E-Agriculture, E-Livelihood, E-Governance, E-Health, E-Education, E-Commerce, E-SME, E-Environment, Climate Change, etc in relation to ICT. The WPS encourages papers that are problem-finding, problem solving, forward-looking, sharing relevant experiences and investigating controversial and important issues.

AUDIENCE

The target audience of this working paper series are those who wish to learn how to encourage adoption of ICT, applications and impact assessment, and also researchers who are interested in the diffusion of ICT for developmental projects in developing countries. Therefore, the target audience includes ICT service providers, policymakers, and academics/researchers, students of social science, information systems, and information technology and development studies.

SUBMISSION REVIEW PROCEDURE

Researchers and practitioners will be asked to submit an abstract of the paper. Those whose abstracts have been approved will be invited to submit complete papers. Papers must be written in English. The full paper must be between 4,000 to 9,000 words including all diagrams and references, and in MSWord or PDF format. All submissions must have names, affiliations and full contact details (including email addresses) of all authors. Authors should utilize the APA Stylebook.

All submitted papers will be reviewed on a double-blind review basis by two unanimous reviewers. The reviewers will be selected by the editorial. The reviewers will provide constructive feedback to authors upon acceptance and rejection of the article. Articles submitted for publication are evaluated according to the following criteria:

- o Significance of the topic
- o Adequacy of the literature review
- o Quality of research design
- o Legitimacy of conclusions
- o Contribution to literature
- o Appropriateness to the Working Paper Series
- o Development of concepts/hypotheses
- o Adequacy of data analysis
- o Significance for practice
- o Clarity of presentation

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