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Challenges for Adopting E-Commerce in Agriculture in Nepalese Context — a Case Study of Kathmandu Valley

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Abstract
E-Commerce is one among the important determinants of the technological era that is being observed in this millennium. It is widely recognized as the tool for enhancing efficiency of different kinds of product marketing as well as retailing. However, Nepalese economy, as a whole, has exploited its benefits in a very little and in particular, agricultural markets. This study has investigated the challenges of E-Commerce in agriculture with multiple perspective based descriptive-analytical approach. The data were collected from questionnaires consisting two parts, including: challenges of E-Commerce and E-Commerce implementation strategies for agriculture sector. For adopting E-Commerce in agriculture; computer's unpopularity as a business tool among farmer and farmers' low levels of literacy (technical-educational factor with factor load 0.61 and 0.51 respectively), the lack of the culture of using computer for marketing purpose (cultural factor with factor load 0.59) , online payment system complexities (security factor with factor load 0.43) and lack of government serious support and investment in E-Commerce (public factor with factor load 0.64) were identified as major challenges. Furthermore, building the suitable E-Commerce portals for agricultural product (CoV: 0.214) along with awareness about advantages of E-Commerce to farmers and consumers (CoV: 0.234) and ease the process of online payment system (CoV: 0.241) with community level initiation in this sector (CoV: 0.26), entry of private sectors in E-Commerce (CoV: 0.266) and internet education to farmers (CoV: 0.274) were prioritized solutions for implementation of E-Commerce in agriculture.

Keywords
E-Commerce – agro-product – challenges – strategies

1. Introduction

1.1 Background

Even in countries with poor infrastructure and access to information technology, evidence exists that dynamic enterprises and governments have taken advantages of the possibilities offered by E-Commerce[1] with facing many barriers such as economic, sociopolitical and cognitive factors[2], linguistic, infrastructure market size and E-Business costs[3]. Unlike electronics, books, sporting goods, pharmaceuticals, and even clothes, there are inherent drawbacks to going to the web to get groceries delivered[4]. 4% of consumers in Los Angeles were buying groceries online, and just 8% in Seattle. In New York, 16% were using these services. It shows that the online grocery delivery industry is in its earliest stages even in USA[5].

In Nepalese context, internet subscribers in Nepal reached 38.78% of whole population[6]. More than two dozen E-Commerce sites are active where Metrotarkari, Chizbiz, Agromart, Kaymu are some existing online groceries from Kathmandu valley. As Nepal is agricultural nation, percentage contribution to GDP by agriculture and forestry sector is 33%[7] which indicates the increasing value of this sector in Nepalese economy. Predominance of intermediaries, influence of Indian market, lack of master plan, poor storage, processing and transportation facilities and weak market

intelligence[8] are few pitfalls of agricultural marketing system where infrastructural-technical, social, cultural, agriculture state and educational factors[9]are relevant barriers to adapt E-Commerce in agriculture. On these backgrounds and contexts, this study was carried out to find out the current challenges for implementing E-Commerce in agriculture in the scenario of Kathmandu Valley, Nepal.

1.2 Problem Statement

Before a decade E-Commerce was setup as sending gifts and money online and other websites promoting "Send Gifts to Nepal" which had merely a concept of E-Commerce. It was target to Nepali residing in USA, UK, Australia and Europe. There was no effect of that business to support the E-Commerce concept in Nepal. Gradually the business was promoted by other companies who saw there was a marginal profit. Along with the rise of IT, and business concept many online stores were launched but they didn't have the actual process of buying and selling online. They were the virtual stores with the best example which gave a concept of selling and buying online but not paying. Many online portals and shopping portals are launched. Leaving the measurement of success behind, they are now on the top list. Peeping into the future of E-Commerce, launch of few large online shopping portals was thought as milestone; everyone thought there will be a turnaround in the E-Commerce industry in Nepal. Now having dozens of virtual Nepali stores in the web, they still have the same problem of payment and a belief of people, they still have a level of trust to build among the visitors[10].

Marketing access to customers and the lack of knowledge about the market prices are some problems of the agricultural production cycle. Villagers and farmers, who are generally small producers, have to accept middlemen prices and as a consequence they will not gain enough benefit. Another problem of farmers is insufficient awareness of prices and market demand. The agricultural marketing system in the country is not found organized. The farmers produced small quantities of food grains, vegetables, fruits, and other commodities and sell in the village and fulfill their basic needs. At present weight, price, quality control and other the village are not systematic. Agriculture marketing works in the interest of individuals which help big farmers only and large number of small farmers are always deprived of due benefits[11].

The advent of E-Commerce in agriculture raises many issues such as suitable E-Commerce business models for which agricultural markets, impact of E-Commerce on farms, agribusiness firms, markets, and rural communities, winners and losers in these sectors. Finally, Government and leader's role to implement E-Commerce in agriculture[12]. This study provides some background, some current facts and some interpretation of the role of E-Commerce in agriculture with analysis of current challenges in this sector.

2. Literature Review

E-Commerce and the various aspects of it remained as a heavily researched topic, however, most of the study references are for developed economy countries and regions and there are very little studies for feeble economy countries.

Jamaluddin(2013) disclosed that E-Commerce practices of farmers in the study area of Trichy district are still at infant stage. The obstacles and constrains are poor internet connectivity , heavy charges by private internet players , lack of program run by ITC's agri-business division in North India[13]. In the context of Mumbai, Singh (2012) revealed that around 37% of respondents were willing to buy grocery online if the option is given. The remaining percentage of the respondent may or may not buy grocery online due the factors like physical examination and security issues. It also found that most of the respondent think that buying grocery is beneficial. They found it is time saving and avoid long queues[14].

In the context of using E-Commerce in landlocked nations, Minges (2000) suggested that those nations should be required to increase sales, generate hard currency, boost employment, welfare gain expertise in information technology, reduce brain drain and urbanization also to lead to better business practices, enhance transparency and efficiency[3]. Barriers of E-Commerce in developing countries were found to be economic, social, linguistic, infrastructure market size and E-Business costs. He found many developing countries suffer from E-Commerce logistical deficiencies such as billing and shipping. A big barrier

was the lack of support for credit card payment. Finally he suggested Government to Business (G2B) model focusing on rural parts for the nation like Nepal. Along with this model he suggested government should assist E-Commerce applications for farmers product prices, input costs, transport schedules and weather reports.

In a case study done in Nepalese background, Press (2000) recommended three projects: a Business-Consumer (B2C) site for marketing Buddhist thanka paintings via the internet, a series of vertically focused workshops bringing together members of the Nepalese IT community and members in industries which may be likely E-Commerce candidates, and the establishment of a village-connectivity pilot project[15]. In another case study - barriers to E-Commerce and competitive business models in developing countries , Kshetri (2007) indicated that economic factors (high ICT access charge, low penetration rate of credit cards), sociopolitical factor (Nepal at level 0 in adoption of digital and electronic signature (DES)) and cognitive factors (related to knowledge, skill and confidence related to E-Commerce usage) play important roles in the adaptation of business models in the context of the developing world. This paper illustrated Thamel.com's influence on its business partners ICT adoption. It provided an overview on Thamel.com's strategy to overcome some E-Commerce barriers and to overcome cognitive barriers, the company provided delivery services as well as delivery confirmation via digital pictures of gift delivery.

3. Research Methodology

Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection[16]. It has three types of methods such as observation method, case study and survey method[17]. Among them this study used the survey method with face to face interview and questionnaires and a case study.

Study Site: The study has been conducted in major three districts of Kathmandu valley; Kathmandu, Lalitpur and Bhaktapur.

Study population: The population of the study were all the professional farmers, agro-product customers, IT experts, and E- Commerce facilitators of Kathmandu valley.

Sampling technique: The researcher used purposive non- random sampling procedure. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable to answer research questions.

Sample size: Forty four farmers (who grow agro-items professionally), sisty two Agro-product customers (including experienced in online shopping), twenty three IT experts, and six E-Commerce facilitators (including agro-product based portals) were selected purposively from three districts of Kathmandu valley.

Data collection tools: The researcher used questionnaire as data collection tool to elicit required data. The questionnaire consisted of four parts, including: Challenges/barriers to E-Commerce (23 items), E-Commerce development solution/strategies (17 items) the questionnaire was designed in a Likert Scale in first phase of survey. In second phase of survey, the questionnaire is multi-choice type for studding of current issue of online shopping of vegetable and fruit items (16 items). Finally, the interview questionnaire for investigating a case of existing portal-Metrotarkari (5 items).

Data analysis procedure: The data through questionnaires were analyzed utilizing SPSS software. Average, standard deviation, coefficient of variation of different variables were calculated and analyzed. Major factors of challenges of E-Commerce in agriculture were purified by factor analysis. Major factors of challenges of E-Commerce in agriculture were purified by factor analysis. In this study, characteristics of descriptive statistics such as average, exponent (or index), standard deviation and coefficient of variation are used. To determine the appropriateness of the data and to measure the homogeneity of variables that attract farmers to group activities, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test measures were applied. These statistics show the extent to which the indicators of a construct belong to each other. Results were then derived by analyzing the factor load of each variable. Proper names were given to each factor by considering the factor loads. Analysis of current issues of online shopping was done and the case of existing portal was analyzed by decoding the audio of chief operating officer of the portal taken during the interview.

4. Results and Discussion

The results extracted through the analysis of the primary data elicited from the respondents (1. Farmer and IT experts, 2. Agro-product customers 3. E-Commerce facilitators) are enlisted below respectively:

4.1 Challenges of E-Commerce in agriculture

4.1.1 Tabulation of Challenges of E-Commerce in agriculture

Based on the research findings the respondents, the most important challenges for ecommerce development in agriculture are prioritized in Table 1. The respondents believe that from 23 barriers of E-Commerce development that were questioned from them, the following factors are the most important barriers for E-Commerce development in agriculture sector: farmer's low level of literacy, not having computer as a business tool among farmers, lack of information technology (IT) knowledge among the general public and lack of trust in electronic transactions (The less value of C.V Coefficient indicates the more agreement of respondents for this challenges).

4.1.2 Factors of challenges

Factor analysis is one of the statistical methods or data analyzing among the whole data set. The main barriers to E-Commerce in agriculture were examined using the factor analysis technique of principal components analysis. As the KMO = 0.6 larger than 0.5, it is concluded that the number of samples is suitable for factor analysis, since KMO value is between 0 and 1 and the closer to one the higher the sample validity.

Four factors with Eigen values greater than 0.5 were extracted and these factors explained 42% of the total variance of factors related to E-Commerce development obstacles in agriculture. In other words, 42% of E-Commerce-related barriers were identified. After studying the variables associated with each factor and their factor loadings, the factors were named as follows: Technical and Educational Factor, Cultural Factor, Security Factor and Public Factor.

The mentioned factors and their Eigen values, Eigen value's percentage of variance and cumulative percentage variance of each factor are presented in Table 4.1.2. In determining factors, factor loadings greater than 0.50 were considered to be significant. The first factor, i.e. Technical and Educational factor explained 12 % of the total variance and 7 variables were loaded significantly. The Eigenvalue of this factor is 1.99, which is placed at the first priority in obstacles of E-Commerce in agriculture. In this factor Computer's unpopularity as a business tool among farmers, Farmers low levels of literacy, Lack of internet in rural areas, Perishability of agricultural products are very important. The second factor was named as Cultural factor. On this factor two variables loaded significantly, and have appropriated 23% of the total variance. In this factor, the lack of the culture of using computer for marketing purpose is very important. The third factor has been named as security factor. On this factor, two variables were loaded significantly. Here, online payment system complexities are very important. The fourth factor has been named as the public factor. Four variables loaded significantly on this factor. Lack of public awareness to E-Commerce, lack of government support for private section in this field and lack of government serious support and investment in E-Commerce are very important. The following table 4.1.3 represents different factors and effective variables of each factor with factor load.

The analysis of the responses from customers' depicted the major challenges as difficulties on assuring the freshness of the agro-items, problem in customer satisfaction, quality and affordability of the products, problem for farmers and lots of people due to lack ness in education of ICT and problem in accepting new technology by the public.

Regarding the same issue the analysis of case study of Metrotarkari showed that the results were partly similar to the aforementioned results. The case study found challenges on maintaining and delivering quality and freshness as major challenge. Traffic congestion and difficulties in finding exact location of the destination, challenge in providing customer satisfaction, cultural challenges, less exposure to banking system, challenges in online payment systems. Farmers' illiteracy and lack of awareness in using IT and E-Commerce service were challenges to implement C2C transaction model.

Table 1: List of variables with average, standard deviation and coefficient of variance

SN	Variables (E-Commerce challenges)	Avgerage out of 5	Std. Deviation	COV
1	Lack of internet in rural areas	3.32	1.039	0.313
2	Cost of computer and internet use	3.5	0.909	0.26
3	Lack of electronic banking systems around the country	3.34	0.939	0.281
4	Lack of communication and network infrastructures	3.3	0.909	0.275
5	Lack of security standards in electronic banking systems	3.28	1.107	0.338
6	Online Payment System complexities	3.4	1.161	0.341
7	Lack of suitable agro-product marketing E-Commerce portals	3.78	0.91	0.241
8	Lack of proper design/model of Agro based E-Commerce	4.06	0.843	0.208
9	Activity of elderly farmers in agriculture sector	3.02	1.02	0.338
10	People's traditional interest to physical presence in the market	3.36	1.191	0.355
11	Lack of trust in electronic transactions	3.14	1.178	0.375
12	Lack of the culture of using computer for marketing purpose	3.56	1.072	0.301
13	Lack of government serious support and investment	3.66	0.895	0.244
14	Lack of customer trust to online product purchase	3.64	0.985	0.271
15	Lack of government support for private section in the this field	3.7	0.763	0.206
16	Lack of rules and regulation existence regarding customer law	3.86	0.833	0.216
17	Computer's unpopularity as a business tool among farmers	3.58	0.992	0.277
18	Farmers low levels of literacy	3.68	0.978	0.266
19	Lack of public awareness to E-Commerce	3.58	1.012	0.283
20	Lack of IT knowledge among the general public	3.7	0.931	0.252
21	Lack of personnel familiarity with English	3.32	0.868	0.261
22	Perishable nature of agricultural products	3.64	0.851	0.234
23	Lack of proper Commercial Agro-product market	3.46	1.014	0.293

Table 2: Factors of challanges

Factors	Factor Name	Eigen value	Variance of Eigen value	Cumulative variance
1	Technical and Educational Factor	1.99	0.128	0.12
2	Cultural Factor	1.66	0.1	0.23
3	Security Factor	1.63	0.1	0.33
4	Public Factor	1.45	0.09	0.42

Table 3: Factor name and effective variables of each factor with factor load(The more value of factor loads indicates the more agreement of respondents for these challenges)

Factors	Factors Name	Variables	Factor Load
1	Technical and Educational Factor	Computer's unpopularity as a business tool among farmers	0.61
		Lack of familiarity with English language	0.58
		Perishable nature of agricultural products	0.55
		Farmers low levels of literacy	0.51
		Lack of proper commercial agro-product market	0.43
		Lack of internet in rural areas	0.37
		Lack of proper design/portal of E-Commerce	0.33
2	Cultural Factor	Lack of the culture of using computer for marketing purpose	0.59
		Lack of customer trust to online product purchase	0.45
3	Security Factor	Online Payment System complexities	0.43
		Lack of security standards in electronic banking systems	0.36
4	Public Factor	Lack of government serious support and investment in E-Commerce	0.64
		Lack of public awareness to E-Commerce	0.63
		Lack of government support for private section in this field	0.5
		Lack of rules and regulation existence regarding customer law	0.45

4.2 Strategies for implementation of E-Commerce in agriculture

Now, sorting the variables having smaller COV to larger COV, the E-Commerce solution for agriculture is ordered as follows in table 5. Here, the priority is given to those variables which have less COV.

Building the suitable E-Commerce portals for agricultural product marketing along with awareness about advantages of E-Commerce to farmers and consumers and ease the process of online payment system is highly prioritized.

Regarding the same issue, from customers' perspective, the identified solutions are similar to other respondents but not the same. For them the solutions are: to implement E-Commerce in agriculture were creation of database of farmer and consumers, making good distribution channel, building suitable online portals-websites and mobile app, maintaining freshness by delivering the items using dry ice in delivery box and proper categorization of items, providing home delivery service on current market price and finally awareness to public about it.

The analysis of case study of Metrotarkari again showed partly similar results regarding the solutions where good distribution channel for supplying the ordered items, good network with other vendors from different place, use the local payment systems with option of cash on delivery, providing free home delivery service at current market price, awaring the public by using social medias were identified as practiced solution for implementing E-Commerce in agriculture.

The present study, to some extent, supports the finding of Asadihkoob and Ebrahimi (2014) who studied the challenges and strategies of E-Commerce in Iran's Agriculture and found five major factors of challenges such as infrastructural-technical, social, cultural, agriculture state and educational. This research was conducted with two hundred fifty numbers of random samples and the outcomes of the research was generalized to the whole country where the present research was conducted with one hundred thirty five samples and focused on the capital city of the country. They found infrastructure development, culture and security and confidence production, and internet training to all classes of people as the most important strategies for E-Commerce development in agriculture. In the same context, the finding of present research is not close to the findings of the study by Minges (2000) where he suggested Government to Business (G2B) model focusing on rural parts for the nation like Nepal. Along with this model he further suggested that the government should assist E-Commerce applications for farmers product prices, input costs, transport schedules and weather reports.

5. Conclusion

The results indicated that there are many challenges in all aspects of E-Commerce adoption in agriculture. These challenges are categorized into four categories: Technical and Educational barriers were found to be major ones others being cultural barriers, security barriers, and public barriers. Based on the derived factor loads; in technical-educational factor the important variables were computer's unpopularity as a business tool among farmers, perishable nature of agricultural products, and farmers low levels of literacy and lack of proper design/portal of E-Commerce. Similarly, the lack of the culture of using computer for marketing purpose (cultural factor with factor load 0.59) , online payment system complexities (security factor with factor load 0.43) and lack of government serious support and investment in E-Commerce (public factor with factor load 0.64) were other major challenges for adopting E-Commerce in agriculture.

E-Commerce development in agriculture needs investment and attention in all sectors. Totally, the solutions of E-Commerce adoption in agriculture are the development of the cultural, infrastructural, social and educational backgrounds. Building the suitable E-Commerce portals for agricultural product along with awareness about advantages of E-Commerce to farmers and consumers and ease the process of online payment system with community level initiation in this sector, entry of private sectors in E-Commerce and internet education to farmers were prioritized solutions for implementation of E-Commerce in agriculture. Hence, If the suggested strategies are implemented to overcome the identified challenges, E-Commerce in agriculture certainly has a good prospect of development in future.

Table 4: Implementation strategies/solution of E-Commerce in agriculture

SN	Variable(E-Commerce Solution)	Average Out of 5	Std. Deviation	COV
1	Cheap and convenient public access to the internet	3.32	1.096	0.33
2	Involvement of more educated and literate people in agriculture	3.44	1.033	0.3
3	Public education on information technology at all levels	3.32	1.115	0.336
4	Development of internet lines all over the country	3.6	0.99	0.275
5	Providing security and trust in electronic commerce	3.68	1.115	0.303
6	Entry of private sectors in E-Commerce	3.68	0.978	0.266
7	Development of credit centers and banks within the community	3.36	0.875	0.26
8	Encouragement to farmers to use E-Commerce	3.38	0.967	0.286
9	Development of electronic governance	3.7	1.055	0.285
10	Creation of a new law in order to protect E-Commerce	3.64	1.139	0.313
11	Creation of awareness in rural through effective institutions	3.5	1.055	0.301
12	Better access to computers for all classes of people	3.52	0.995	0.283
13	Cooperation between government body and educational institutions	3.7	0.995	0.269
14	Internet education to farmers	3.74	1.026	0.274
15	Build a suitable E-Commerce technology/portal for agriculture product	3.94	0.843	0.214
16	Aware about advantages of E-Commerce to producer and consumer	3.64	0.851	0.234
17	Aware and ease the process of online payment system	3.78	0.91	0.241

Table 5: Priority order of E-Commerce solutions for agriculture sector (The less value of coefficient of variance (COV) indicates the more agreement of respondents for these solutions)

SN	E-Commerce Solutions	COV
1	Building the suitable E-Commerce portals for agro-product marketing	0.214
2	Aware about advantages of E-Commerce to producer and Consumer	0.234
3	Aware and ease the process of online payment system	0.241
4	Development of credit centers and banks within the community	0.26
5	Entry of private sectors in E-Commerce	0.266
6	Cooperation between government body and educational institutions	0.269
7	Internet education to farmers	0.274
8	Development of internet lines all over the country	0.275
9	Better access to computers for all classes of people	0.283
10	Development of electronic governance	0.285
11	Encouragement to farmers to use E-Commerce	0.286
12	Involvement of more educated and literate people in agriculture	0.3
13	Creation of awareness rural through effective institutions	0.301
14	Providing security and trust in electronic commerce	0.303
15	Creation of a new law in order to protect E-Commerce	0.313
16	Cheap and convenient public access to the internet	0.33
17	Public education on information technology at all levels	0.336

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