Promoting Development Potentials with Web Applications: An E-Marketplace for Horticulture Businesses in a Developing Country

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ABSTRACT

We propose a promotional framework for e-commerce in developing countries and illustrate the concept with a prototype e-marketplace for horticultural trades in light of new realities. Trading information was gathered from a key horticultural trading centre during a field study. Various socio-economic-technical issues were considered in the design as per the framework concepts.

INTRODUCTION

E-commerce (Turban, King, Lee, & Viehland, 2003) and other uses of the Internet have been promoted for social uplift in developing countries by various international agencies (UNCTAD, 2001). Ngai and Wat (2002) identified 275 articles on e-commerce in leading information systems journals. These articles deal with myriad e-commerce related topics including conceptual frameworks (Wigand, 1997; Zwass, 1996), e-commerce practice issues (Vadapalli & Ramamurty, 1998) and e-commerce strategies (Javalgi & Ramsey, 2001). Zwass (1996) presents a framework consisting of seven layers tailored mostly to the developed countries. The seventh layer of this proposed hierarchy refers to electronic marketplaces. The Global Diffusion of Internet (GDI) Project made extensive investigation of the global spread of Internet in terms of a six-dimensional framework (Wolcott et al., 2001). Travica (2002) discussed a framework for e-commerce in developing countries and listed various infrastructural conditions for e-commerce success. Okoli and Mbirika (2003) developed an integrated framework for assessing e-commerce in Sub-Saharan Africa. While all these frameworks are mostly conceptual in nature, very few articles mention design and development issues about e-commerce applications. In this paper we discuss the actual development and design of an e-commerce application (specifically an e-marketplace) within the context of the conceptual frameworks. Although there is a diverse range of definitions (Malone, Yates, & Benjamin, 1987; Bakos, 1998; FTC, 2000) for e-marketplace, we define it as a B2B information system that uses the Internet for communications and trade, allowing the participating buyers and sellers to exchange information about prices and product offerings and facilitate transactions. A recently published report on “E-Commerce Trade & B2B Exchanges” mentions that worldwide B2B e-commerce is expected to reach as high as $1.4 trillion in 2003 (Global Information, 2003) and the growth in trade through e-marketplaces has been a major contributor to B2B e-commerce (Stockdale, & Standing, 2002). At the height of the dot com euphoria, some reports estimated the number of globally operating e-marketplaces to be around one thousand or more (Hurvitz, 2000; Karpinski, 2000; Tadesci, 2001). Such expectations, however, faced the realities during the dot com downturn and both buyers and sellers expressed reluctance to participate in e-marketplaces due to the complexities and novelties of electronic trading (Deter-Schmelz, Bizzari, Graham, & Howdysell, 2001; Wise, & Morrison, 2000). Recently, however, some segments of the e-marketplaces have made a comeback. Quadrem has doubled the revenue from the industrial products for metal and mining industries in the early part of 2004 (Schwartz, 2004). In spite of this volatility, e-marketplaces continue to hold promise for future global transactions affecting not only the developed world, but also developing countries.

The e-marketplace being proposed here must take into consideration the limitations and other realities for e-marketplaces in developing countries (Humphrey, Mansell, Pare, & Schwartz, 2004). How these realities can be incorporated into the design of an e-marketplace and make it functional as much as possible by circumventing limitations is the focus of this paper. We further demonstrate the ideas by developing a prototype system for the sake of illustration and initiating discussions among academics and information and communication technology (ICT) practitioners. This study will help us understand the issues and challenges while enabling us to explore and promote the prospects for e-commerce diffusion in developing countries. In addition, the paper will lead to an innovative design approach that will best suit the incremental development requirements of the system satisfying socio-economic realities of developing countries such as Bangladesh.

E-COMMERCE FOR DEVELOPMENT: SUMMARIZING EFFORTS TOWARD A PROMOTIONAL FRAMEWORK

Volumes of publications promoting the Internet for developing countries can be sourced to organizations such as UNCTAD, OECD, WTO and the World Bank, among others, and can be obtained from their respective Web sites. In this section we cite a few representative references in order to project a summary of the phenomenon, with a...
view to develop a promotional framework for the developmental potential of e-commerce. UNCTAD publishes a report every year tracking the progress of ICT for development and we quote from the latest report (UNCTAD 2005 report, p. 16; Web site: http://www.unctad.org/ecommerce/).

The potential of ICTs to facilitate and increase trade should be considered in national and bilateral trade policies and negotiations. International organizations and Governments have a major role to play in making the international debate more coherent, including through better coordination of policy development dialogues. Research organizations have a role to play in identifying the factors that may obstruct ICT adoption. Universities and research centres should be encouraged to research managerial practices, links between ICT investments and productivity growth, and the leveraging factors of firms’ competitiveness in developing countries.

Similar studies are also reported from academics, other development partners and organizations, and freelance reporters. We can classify them into three broad categories: a) promotional, b) perception of realities and c) conceptual.

Most of the studies from development agencies under the United Nations and the World Bank promote e-commerce for development while addressing various issues that confront its implementation in the developing countries. Goldstein and O’Connor (2000) analyzed several potential benefits of e-commerce for the developing countries. They promoted the idea, and at the same time identified several issues for consideration and means to overcome barriers. Mann (2000) noted e-commerce as an increasingly important economic activity for development as it merges domestic and international marketplaces. Mann also outlined suggestions how developing nations should approach negotiations in the World Trade Organization (WTO).

Concerning perception of realities, some studies shed an optimistic light and others cast a shadow of skepticism. For example, Odedra-Straub (2003) questions the optimism of UNCTAD’s promotional reports by emphasizing that most developing countries still lack e-readiness due to poor infrastructure, lack of education and a weak legal framework. Sulaiman (2000) investigated the status of e-commerce applications in Malaysia and reported that communication via e-mail was the most widely used application (70%). Goldstein and O’Connor (2000) also noted that 82% of usage in Bangladesh was related to e-mail. On the other hand, applications such as those for coordinating procurement, monitoring trade, and tracking shipment of goods were not widely used. These applications required a substantial amount of financial investment and most organizations could not afford it. These findings also indicated that security concerns were the main barrier to e-commerce implementation. But, these refer to the year 2000 and things have changed tremendously since then. Pitfalls in the early stages of adoption of any technology are not surprising and with time, favorable pictures emerge. In a recent publication, Meera, Jhumati and Rio (2004) studied three projects related to ICT in agricultural development in India and came to the following conclusions- 1) Efforts should be made to incorporate ICT in all endeavours related to agricultural development and 2) Organisations and departments concerned with agricultural development need to realise the potential of ICT for the speedy dissemination of information to farmers. Recently, McMaster and Nowak (2006) compared and examined advancement and evolution of trade-facilitation and promotion via trade portals in the Pacific Islands Countries (PIC) and noted numerous benefits from ICT-enabled applications. They recommended establishment of regionally integrated single window portals for maximum benefit.

On the conceptual front, Okoli and Mbarika (2003) developed a new conceptual framework for assessing e-commerce in Sub-Saharan Africa (SSA) based on previously developed frameworks of Zwass (1996), Wolcott et al., (2001) and Travica (2002). Within this framework, Okoli and Mbarika (2003) noted that electronic markets for products might have very much potential in developing e-commerce in SSA because they involved internal trade among African business partners. Montalegre (1996) also promoted the need for skilled and forward looking managers for implementing e-commerce that include online storefronts and malls. Most concepts about ICT applications for development are based on experience and other developmental studies. Often, they were promotional and provided thought-based guidance and could not justify with real-world data that hardly existed.

Now, given the above three approaches of research and investigations, the obvious relevant question of current significance is “What is next?” The answer to this question can be framed as a list of suggested actions which can be termed as a promotional framework. This framework is again conceptual but is based on the above representative findings:

1. Promotion of ICT (e.g., e-commerce) for development should continue as we continue to learn how to address various issues.
2. New applications should be developed based on socio-economic-technological realities that may vary from one country to another.
3. First hand knowledge about such site-specific realities should be gained from field studies and other means.
The promotion of an e-marketplace for horticultural products in Bangladesh as conceptualized in this research follows the above framework with special focus on the design aspects. Montaleza’s (1996) virtual mall may have many storefronts, each dealing with multiple items. But the e-marketplace we are proposing here is more like a bazaar that brings together many buyers and sellers (each of them dealing with single item such as one type of fruit at a time). We present and promote the idea here with the underlying spirit so as to evaluate opportunities and take initiatives to develop new services using the Internet. Otherwise, waiting for the infrastructure to improve may allow the gap with the developed world to grow even wider and miss the opportunity for accelerated development and poverty alleviation.

REALITIES OF E-MARKETPLACES FOR DEVELOPING COUNTRIES

In Thailand, a local company (Biz Dimension) launched foodmarketexchange.com, an e-marketplace for Thai export-oriented food industries (Crispin, 2001). B2Bpricenow.com is another successful example of an e-trade partner for agricultural and food producers in the Philippines. Rao (2003) mentioned several Web-based information systems some of which are poised to make significant contributions in the rural economy through e-commerce and to facilitate related social development in India. The garment and horticultural industries of Bangladesh, Kenya and South Africa have been exposed to e-marketplaces to some extent, as well. In the late 1990s, B2B e-commerce marketplaces, among other applications, were being promoted by the development agencies such as UNCTAD (2001) for the developing countries as tools for accessing global markets and for remaining competitive. Some of the key expected benefits are: global competitiveness, reduced geographical distance, possibilities for rural and small enterprises, avoiding trade intermediaries, and online payment and transactions (Humphrey, Mansell, Pare, & Schwartz, 2004). Such expectations had significant policy implications for increased investments in ICT infrastructure and support systems for secure, fraud-resistant digital payment and settlements.

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<th>Table 1: Key features of the e-marketplaces in selected developing countries and their usage patterns</th>
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<td>Vast majority of the e-marketplaces were information-oriented, not transaction-oriented. They facilitated introduction through message posting, links and requests for quotes, but not online trading. The initial contacts are generally followed by communications through other traditional channels such as e-mail, telephone, fax, or regular mail services.</td>
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<td>Most of them avoided responsibilities of online payments.</td>
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<td>There were hardly any mechanism for screening participating firms and independent verification of product information.</td>
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<td>Some successful e-marketplaces still needed the help of traditional intermediaries for product verification, made use of traditional channels for payments and delivery.</td>
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<td>Many developing countries’ firms were registered with at least one e-marketplace.</td>
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<td>Firms mainly used the e-marketplaces for gathering information about buyers and sellers, but did not develop enough confidence and trust to complete transactions online. Breaking away from the existing business models has been a challenge.</td>
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<td>Most of the B2B e-marketplaces were intended for global access and avoided use of the domestic market. Even the limited use for external businesses was confined within the existing relationships and did not promote new connections.</td>
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<th>Table 2: Requirements for a new e-marketplace for a developing country (e.g., Bangladesh)</th>
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<td>The e-marketplace should be extended to the domestic market where the perceived risk may be lower than in the global context. This will enable confidence and trust building through familiarization over time.</td>
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<td>The e-marketplace should add functionalities in stages, first being information-oriented and then facilitating transactions and payment options at a later time. The system should be designed so that these objectives can be met with little modification and upgrading; the features should be there but not to the fullest extent at the beginning.</td>
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<td>The e-marketplace should allow the best mode for exchange of dynamic information and should facilitate online communications between buyers and sellers. A Web-based system with a convenient interface should be designed.</td>
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<td>The system should enable buyers and sellers to register dynamically on the Web.</td>
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<td>It should be able to provide relevant information to both buyers and suppliers, not only about the products but also about further communication channels to complete transactions.</td>
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<td>Information about products should be presented in a structured form that is explicit about the geographical location, product type, product variety and product conditions. Searching for products within a region, and searching a region for a product should make it easier to use the system.</td>
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<td>It should facilitate the initiation of transactions, and payments can be done offline using existing channels because online payment facilities are not well developed in Bangladesh yet. However, for the future the system should keep an option so that such facilities can be added with minimum effort without requiring a major change in the system.</td>
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<td>The system should make the best use of databases as the system will be developed incrementally and changing the contents of the database is much easier than changing code. For example, the forms and pull-down list boxes should be populated from the database instead of being hand coded.</td>
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In order to investigate the reality of these expectations vis a vis the marketplace, Humphrey, Mansell, Pare & Schwartz (2004) investigated 184 e-marketplaces dealing in apparel and horticulture. Several businesses from Bangladesh, Kenya and South Africa that used some of the features of these e-marketplaces were interviewed. They
found little evidence that they were using the e-marketplaces for buying, selling or finding new customers online. Rather, other existing channels are still in use with the Internet playing an important role for communication and coordination. Some of the key features of these e-marketplaces and their usage patterns are summarized in Table 1 which is based on discussions in Humphrey, Mansell, Pare & Schwartz (2004). While benefits from the e-marketplaces are still anticipated to be great, the functionalities, contents and services of e-marketplaces for developing countries may have to be redesigned (see Table 2) to provide the best advantage to those economies. In this paper, we discuss the issues and prospects for an e-marketplace in Bangladesh’s horticultural sector and demonstrate the concept by designing a prototype system. Its architecture and features take into consideration the new realities listed in Table 2.

The design, development and implementation of an e-marketplace for Bangladesh will largely follow the concepts presented in Table 2 which points out some differences with the generic e-commerce trade cycle styles. Whiteley (1999) discusses them in the context of e-commerce models for developed countries. Such required differences were noted by Travica (2002) for an e-commerce diffusion model for Costa Rica. Travica presented a multi-layered infrastructural model in a pyramid-like structure consisting of transportation (bottom), delivery, telecommunication, software industry, e-payment, and customer e-commerce propensity (top). These are relevant in the context of Bangladesh as well. We take the position in this paper that an e-marketplace initiative for countries like Bangladesh is still worth pursuing, in spite of many infrastructural and socio-political matters that are still far from ideal. That is why, in Table 2, we emphasize the concept of incremental development of e-commerce applications that take into consideration the imperfections of the developing world. For example, modes of transportation and delivery in countries like Bangladesh are problematic but they have been working for centuries, albeit inefficiently, and are constantly being improved with the introduction of new technologies and increasing income of the citizens. In addition, the distribution and growth of income is not uniform across the entire population. However, there is a sizable growing middle class (about 9% of total population of 140 million compared to 18% and 30% in Pakistan and India respectively (Mukherjee, 2006)) that dominates commerce and will be playing an active role in the implementation of e-commerce. They will have access to limited advanced telecommunication facilities as well as the necessary access to credit facilities. In a recent article, The New Nation (2006) reports that Bangladesh’s mobile phone subscriber base has been doubling every year since 2004 and is expected to reach 18 million by 2007. We believe that such issues are important and cannot be ignored in the context of an e-marketplace initiative. In the literature, such ideas have been discussed in Bangladeshi contexts as well (Hossain, 2000). This includes health-care applications in telemedicine (Kabir, & Ashraf, 2003), medicine and physician information portals (Ahmed, Alsh, Shams, & Sobhan, 2002) and e-commerce applications (Hasan, Arifuzzaman, & Hasan, 2003). Hasan, Arifuzzaman & Hasan (2003) specifically noted various limitations (lack of trust, limitations in online payment and legal support, weak infrastructure and delivery stems, to mention a few) for the application of e-commerce in Bangladesh. We particularly propose to start with an information-oriented marketplace (IOM). An improved flow of information will have a tremendous impact on the eventual flow of goods and services and thus will act as a catalyst for changes in other related infrastructural matters. The IOM will better facilitate the exchange of market information regarding product availability, price and demand status. We discuss various socio-economic issues about Bangladesh later in the paper.

**HORTICULTURAL BUSINESS IN BANGLADESH**

Fruits and vegetables are not only important for our nutrition and diet; they can also generate a sizable income for the producers. Thus, potentially they can play a significant role in reducing poverty in rural Bangladesh. However, such an objective can be best achieved only if the products can be marketed efficiently to a broader customer base across the entire country. The e-marketplace for Bangladeshi horticultural products is proposed and designed to meet these goals. Such an e-marketplace can help maintain and dynamically provide the most up-to-date information about the year-round supply-and-demand of various horticultural products for the whole country. It would facilitate enhanced communications between buyers and sellers and may eventually lead to online transactions. This would not only ensure better prices for the sellers, but also for the buyers who would enjoy the benefit of better planning and waste reduction as the products move rapidly through an improved marketing channel. Lately, in Bangladesh, farmers have been taking the initiative to grow special fruits (such as bananas, lemons, papaya, special types of mangoes, etc.) to generate extra income. However, producers can get better prices for fruits and vegetables only if the produce can be more efficiently available efficiently across the country to more customers in urban areas where people have much higher buying power. Since Bangladesh does not have well-developed facilities for cold storage and fruits ripen quickly in the tropical climate, a large quantity is wasted during delivery.
and in warehouses. An information-oriented e-marketplace can make the horticultural business far more efficient by spreading the market information across the country, dynamically managing the supply-and-demand equation and reducing waste.

**RESEARCH METHODOLOGY AND DESIGN OF THE PROTOTYPE SYSTEM**

This research is based on assimilating information in the existing literature (see Sections 1-3) with information obtained through a field study. Several articles highlighting the role and success of the horticulture sector in the rural economy have been published in the online versions of Bangladeshi newspapers during the last few years. These articles were carefully studied to grasp the significance of this industry. In order to gain knowledge about the business practices actually followed in Bangladeshi horticultural industry, a short trip to Dhaka, the capital city, was fully utilized. Accommodation was arranged in Hotel La Vinci which overlooked the sprawling Kawran Bazaar, the largest wholesale market of fresh fruits and vegetables in the city. Although the market was open round the clock, it was observed that it became busier just after midnight. As hundreds of trucks were unloading the supplies brought from all over the country, many traders from the city’s local bazaars were collecting their daily purchases from the wholesalers and heading for their destinations in myriad modes of transportation. Next morning, several one-to-one conversations were carried on with traders at several businesses. The business scenario became obviously clear. It has been a tradition that growers around the country sell their products to local traders who carry them to large wholesalers in big cities. The wholesalers set the price based on the supply on a particular day. Such a captive business environment does not guarantee the best prices for the producers (especially the small producers) who might have received a better price if the products had been made more readily available to another part of the country. Thus, even a limited-function e-marketplace for marketing and communication (online transactions and payment facilities can be added incrementally as needed) can help bring a major beneficial change in the horticultural trade. Eventually such a concept may be extended to fresh-cut flower, livestock and fisheries industries as well. The e-marketplace can help the producers plan their marketing strategies even long before the products are ready for market. It can also extend their reach to specific overseas markets such as the Middle East where such products enjoy high demands among Bangladeshi expatriates (ATDP Research Team, 2005).

The prototype e-marketplace (FruitWorld.com) is designed using .NET technology and ASP.NET and VB.NET and MS Access™ database technology. It is hosted in a PC running an IIS Web server. Microsoft’s .NET and. In this research project, we adopted the .NET technology mainly because “.NET solutions are simply less expensive to build, less expensive to deploy, and less expensive to maintain” (Miller, 2003) although Sun Microsystems’ J2EE provides a different, perhaps competing, strategy for implementing dynamic Web-based systems/services (Williams, 2003). The flowchart of the Web-based system (segment for the administrative interface and functions are not shown), summary of databases and selected sequence of screen shots are shown in the Appendix.

**POTENTIAL BENEFITS OF THE SYSTEM AND SOME OTHER REAL ISSUES IN BANGLADESHI CONTEXT**

Above discussions lead to the following summary of potential benefits of the proposed information-oriented e-marketplace for Bangladesh:

1. It will support growing interest in horticulture for extra income generation.
2. It can help spread market information and planning even at an early stage even when the products are not ready yet for the market.
3. It will provide better price for products through countrywide efficient marketing.
4. It will support dynamic management of supply-demand equation.
5. It will reduce waste through rapid movement of products.
6. It will free rural producers from a captive market environment by overcoming geographical distances and avoiding trade intermediaries.
7. It will improve buyer-seller communication channel and facilitate online transactions.
8. It will support possible extension to overseas markets and other products such as fishery, flower, poultry and livestock.
9. Increase the global competitiveness of Bangladeshi growers with advantages for rural and small businesses.
10. It will support possible extension to overseas markets and other products such as fishery, flower, poultry and livestock.
11. Increase the global competitiveness of Bangladeshi growers with advantages for rural and small businesses.

Item 5) needs some discussion because it has been mentioned frequently in the literature (Travica, 2002) that a major concern for e-commerce success in developing countries is the poor delivery system. The transportation system in Bangladesh is problematic, especially the railway that needs investments to modernize. Recently road communication has improved tremendously because of the construction of several bridges across the mighty...
Ganges, Jamuna and Meghna rivers. Geographically Bangladesh is a small country and it is now possible to go from any remote corner to the capital city Dhaka by road within half a day, even though the mode of transportation is still slow compared to many other countries. Therefore, rapid movement in item 5) does not imply fast delivery. The proposed information-oriented e-marketplace will enable wider market access through dissemination of information. Thus many more buyers will be available from across the country and products are expected to be sold and dispatched to many dispersed destinations without causing inventory build-up at one location. Currently, all growers target a few metropolitan areas (mostly Dhaka) to seek buyers. This causes oversupply, waste and value depreciation and a slow movement of products at the transaction level. The proposed e-marketplace will increase rate of flow of goods from the regional sources by increasing the number of transaction channels, while each channel will still be restricted by the relatively slow delivery system that is constrained by the existing physical infrastructure. Of course, an improved infrastructure will further help delivery of merchandise.

Rights and responsibilities of participants in networked communities are reported in NRC (1994). This study focuses on the United States and thus all of its findings cannot be readily applied to developing countries. However, the study makes an observation that every networked community is different. Therefore, the same development scheme cannot work for all communities. Similarly, the same level of skepticism or optimism is not applicable to all networked communities. Even results from studies about e-commerce in other developing countries may not be applicable to Bangladesh which has its unique socio-economic and cultural conditions. The best way to learn about e-commerce diffusion and adoption in Bangladesh is to study a Bangladesh-specific case. Therefore, this research is undertaken with such a spirit along with a note of optimism, assuming that skepticism will exist and concerns will be raised. Experiment with e-commerce (e.g., e-marketplace) implementation and subsequent investigations will promote a better understanding of developmental issues influenced by ICT. We have advanced the concept of an e-marketplace on the basis of information gained from the field study (see earlier section) and supported by the author’s real-life experiences.

When AgriBazaar of Malaysia was first started in 2003, there was a lot of skepticism due to lacking growth of clients and slow transactions. However, by the middle of 2006, it has become a centre of active trades showing strong growth trend. It maintains the site both in Malay and English and provides live usage statistics. Following information (obtained via personal communication) presents a promising picture:

- **Hits/month**: a million
- **New members’ registration/month**: 600 compared to about 200/month last year
- **Total offers**: 400 (2005), 850 (2006) valued at more than RM 18 million (RM = Malaysian Ringgit).
- **Total on-line catalogues created by members**: More than 270 compared to just 80 last year.
- **Email services provided on-line within AgriBazaar has about 50% active usage.**

It is worth mentioning the impact of similar initiatives in other countries. For example, Agri-Bazaar (https://www.agribazaar.com.my) is a well designed e-marketplace for agricultural products in Malaysia. However, it is reported (private communications) that initially it has been slow to achieve the expected impact and users report little relevance of the system to their needs. There may be many factors for such a response. But, nothing much is known yet and perhaps more time is needed before we see any impact (see the vignette below). We must not forget that the society and economy of Bangladesh are very different from those of Malaysia (with a huge number of expatriate workers) and agriculture is a very small component of latter’s source of national income. Palm oil is a special crop. So, the level of interest and involvement cannot be the same as in Bangladesh where a big impact may come from the potential for poverty eradication. Any subsequent study may also encourage further research for establishing common reasons for market responses of all similar initiatives. Such future findings are in addition to contributions from this research which we summarize below:
1. This paper shows how information can be gained from field studies and how they can be used for designing an e-marketplace for a developing society like Bangladesh.
2. It also shows how various social issues (see below) can be addressed by considering special design factors.
3. It also outlines how technology can be used for social uplift, especially for rural farming communities dealing with diversified products.
4. It also shows how we can promote technology (with special emphasis on the design issues of the system, not its use alone) for development.

Studies regarding the use of the systems are of importance in their own right. As we just reported regarding the Agri-Bazaar in Malaysia, time taken by the society to respond to such technologically intensive initiative is much longer than we anticipated. Therefore, any extension of this study to include a usage report as well is unwarranted at this time. In the next phase of the investigation, we intend to find out how the stakeholders (like growers, buyers, sellers, social thinkers, concerned public/private sector institutions, retail customers and other researchers) perceive the initiative. Investigating their expectations, limitations, fears or hopes will be matters of interest in future studies which can be done only after an application is implemented. This necessitates the emergence of real-world application-based e-commerce diffusion and adoption research beyond the well-studied conceptual frameworks alone. This paper makes an effort in that direction. In order to make such an effort meaningful, it is necessary to identify the potential beneficiaries of the horticultural e-marketplace. Individual farmers may not be able to gain immediately unless they are large-scale producers and have sufficient financial and technological strength. However, small growers may form co-operatives to take advantage of the system. Other potential beneficiaries are mid-sized regional traders, buyers from major trading centres and processing industries, and overseas importers. It is expected that if the local traders or the co-operatives can realize higher prices for their products because of wider market access via the e-marketplace, the growers and farmers will also eventually benefit. Some of the requirements for the implementation of such a system are listed below:

Access to Internet service (kiosks or Information Centres)
ICT training & education
Some affordability to pay for costs depending on how much is publicly available.
Other modes of communication (telephone, transportation)
Co-operation from financial services
Trust and effective legal system

These requirements involve costs. However, FruitWorld.com can generate income from user fees, advertisements and links to related businesses such as nurseries, health promoters, processing industries. Potential risks are infrastructure failure, fraudulent practices, security and operation of the kiosk type Information Centres, and malicious threats.

OTHER IMPLICATIONS FOR RESEARCH AND SERVICE

Every year, as noted earlier, UNCTAD has been reporting global e-commerce related activities and especially promoting it for developing countries. In its latest report (UNCTAD Report, 2005), data related to several ICT indicators have been presented in order to highlight various trends which support the promotional framework proposed earlier in this paper. Already in the 2003 report (UNCTAD Report, 2003), e-markets and electronic payments were mentioned as two of several possible tools and techniques for e-commerce in developing countries. Possible benefits for e-markets and online auctions were listed as reduced costs, reduced or transformed use of intermediaries, and price transparency and formation – all in favour of development.

Qureshi (2005) proposed a model summarizing the relationships between IT and development in terms of five ICT effects on development: 1) access to information and expertise, 2) competitiveness and access to markets, 3) administrative efficiencies, 4) productivity through learning about innovations and 5) poverty reductions. Qureshi and Davis (2006) further performed an extensive literature review and identified specific benefits of particular technologies in respect of these five effects for micro-enterprise development. E-markets were cited for reduced costs with respect to effects 1), 2), 4) and 5). Electronic payments were noted for price transparency and formation with respect to effects 1) – 3). The horticultural e-marketplace discussed in this paper will support micro and small enterprises as defined by Duncombe and Hicks (2002) who defined micro enterprises as unregistered and rural having less than 10 employees and representing majority of the rural business organizations in the developing countries. In the context of the proposed e-marketplace in Bangladesh, the issue of online payment is discussed below.
Online Payment

The prototype e-marketplace is initially expected to promote dynamic exchange of market information and provide guidance to potential buyers to complete transactions following the traditional channels. Bangladesh has not developed any online payment and transaction system and the society has not grown trust in such systems yet. Therefore, such additions are left for future developments. We suggest three possible alternatives.

Credit Card. Credit card-based online payments can be used by the marketplace once they become widely available. This will require only a minor system modification. Many financial institutions already offer such facilities, which may not be available to individual low-income growers, but will be available to regional traders or cooperatives formed by growers who are the potential immediate beneficiaries of the e-marketplace. Although defaulting on credit has been a chronic problem in Bangladesh as another manifestation of corruption, it is mostly limited to large-scale borrowers having political patronage. Therefore, since the amount of credit that might be involved in the horticultural trade is not expected to be very large, limited credit facilities with short repayment periods will be the recommended approach to avoid large-scale defaults. If a dealer defaults on credit, the issuer can immediately prevent him/her from further borrowing. While discussing credit-related corruption in Bangladesh, it is worth taking note that the micro-credit system is very successful (in spite of high interest rates) especially in the rural areas of Bangladesh (Yunus, 2003). Its success in poverty reduction has been recognized all over the world. Here, the peer-pressure among the small borrowers acts in favour of loan recovery. So, loan recovery rate is very high in the micro-credit sector. It has yet to be seen if such a trend will work as well in the horticultural trading sector via the e-marketplace being proposed in this paper. For example, the identities of the defaulters can be posted on the Web site and thus preventing the defaulters from further transactions in the e-marketplace. Such an internet-based social pressure may play an effective role (analogous to the peer pressure working in the micro-credit environment) to curtail defaulting tendencies among the debtors.

Bank Mediated System. Online payments also can be managed through banks. The buyer can send an e-mail to his/her bank about a potential transaction; the bank debits the buyer’s account and holds the amount for the seller. The bank releases the fund to the seller once authorized by the buyer after actual receipt of the merchandise. Presently, the minimum requirement is valid e-mail accounts for all.

Third-Party Issued Prepaid Cash Cards. Prepaid cash cards (PCC) issued by third-party financial institutions can be useful. Buyers are expected to purchase these cards from vendors, activate or register them online at third-party Web sites and then use their card information, authentication code, and personal identification numbers during online payment. The schematic diagram of such a system is shown in Figure 3.

**Figure 1**

Prepaid Cash Card System Schematics

![Diagram of Prepaid Cash Card System Schematics](image)

In addition, some other socio-economic and cultural issues that specifically relate to Bangladeshi society are discussed below.
Haggling

It is part of Bangladeshi shopping culture (and may be also true in many other societies of the world) that products are rarely sold at fixed prices. Price negotiations through haggling are common before buyers and sellers agree to a price acceptable to both parties. That is why in this prototype e-marketplace, off-line negotiations are enabled via other channels such as telephone, e-mail or even onsite visitations. Seller and buyer can carry on negotiations via other channels and at the end settle for a different amount and price (or cancel the order) by utilizing the “Finalize,” “Edit Item” and “Remove” buttons in Figure A. Haggling, as opposed to fixed price dealings, may not be an efficient practice. However, for a system to be acceptable, initially it cannot turn off a common practice so deeply ingrained in cultural.

Trust versus Corruption

Prevalence of corruption in a society adversely affects development activities not only in the public sector (Delavallade, 2006), but also in the private sector. Weak legal systems, a prevailing culture of social elite domination, and existing high level of corruption often pose difficulties in completing commercial transactions transparently. The e-marketplace proposed in this paper has to take into consideration the issue of corruption in Bangladesh. Any mechanism that can inhibit corrupt practices will contribute to development. For every commercial transaction, not only must the seller receive payments, but the buyer must get delivery of the products. In addition, the products that this e-marketplace deals with are not standardized. Therefore, seller-posted images or even videos may be of immense help. Here the descriptive comments including visual postings (e.g., images and videos) can overcome some difficulties. Yet, in some cases an onsite visit from a buyer to a seller’s location may be resorted to for verification of products. Or there may be third-party agents who would certify the products for a fee and thus avoid the actual trip for a buyer. These are just a few suggestions, although they have not been tested for effectiveness in Bangladesh which has been ranked high in corruption by Transparency International. It should be noted that large-scale corruption is more prevalent in the public sector (often assisted by political patronage), whereas the horticultural business envisaged by the e-marketplace is in the private sector involving small to medium size businesses. There is no doubt that a more effective legal system is the best answer to minimizing corruption. This would help the victims seek redress more successfully. Bangladesh government has already established such a legal system (Ortho Reen Adalat meaning “court for money and credit”) dealing with financial transactions only. Bloomberg columnist Mukherjee (2006) mentions about Goldman Sachs report which states that enforcing a contract is 4% cheaper in Bangladesh than in China, where a creditor ends up losing 25% of the value of the debt in the process of trying to collect it legally (see World Bank Web site http://www.doingbusiness.org).

CONCLUSION

Agriculture is the backbone of the rural economy of Bangladesh. In addition to traditional crops and livestock, horticultural products and vegetables are two important products that can generate additional income for rural producers. It is well known that vegetables are sold in cities at prices much higher than those offered to the farmers in the villages. However, the middlemen grab the lion’s share of the profit from such products. An electronic marketplace may provide opportunities for the rural producers to market their products to a wider customer base for a better price. The Bangladeshi government has accepted a plan to improve the ICT infrastructure discussed in this paper and it is a timely initiative that cannot wait until a country-wide infrastructure is in place, because such a delay will not only deprive the rural poor from enjoying the benefits as soon as possible, but also will widen the gap with other parts of the world and render the country less globally competitive (Talero, & Gaudette, 1996). Such an initiative will promote the new technology among users, academics, practitioners and government and non-government agencies who will be forced to engage in ICT development and its implementation. FruitWorld.com is an information system that integrates technology, people, economy and the society at large. In Bangladesh, the focus should not be on science and technology alone, but also on information systems that embrace a full context of data, technology, people, policies, processes, institutions, incentives, and infrastructure. Through systems, information technology accrues value to society as it builds on societal capabilities.

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APPENDIX

Discussion of the FruitWorld.com prototype system and Some Related Issues
Some of the database tables are described in Table A1.

<table>
<thead>
<tr>
<th>Table Names</th>
<th>Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyers</td>
<td>b_id, b_username, b_firstname, b_lastname, b_confirmed</td>
</tr>
<tr>
<td>BuyersInfo</td>
<td>b_id, b_street, b_phone, b_city, b_country, b_postal, b_email, b_region, b_phone</td>
</tr>
<tr>
<td>FruitList</td>
<td>f_id, f_name, f_variety</td>
</tr>
<tr>
<td>FruitNames</td>
<td>f_id, f_fruitname, f_fruitvariety</td>
</tr>
<tr>
<td>OrderCart</td>
<td>o_id, o_buyerID, o_itemID, o_sellerID, o_unitprice, o_qty, o_totalPrice, o_complete, o_requested</td>
</tr>
<tr>
<td>Region</td>
<td>rd_region, rd_District</td>
</tr>
<tr>
<td>SellerItems</td>
<td>s_id, s_itemname, s_vareityname, s_qty, s_unitprice, s_unit, s_numbercount, s_dateofposting, s_moreinfo, s_itemID, s_qtypending, s_qtyavailable</td>
</tr>
<tr>
<td>Sellers</td>
<td>s_id, s_username, s_password, s_firstname, s_lastname, s_confirmed</td>
</tr>
<tr>
<td>SellersInfo</td>
<td>si_id, si_street, si_phone, si_city, si_country, si_postal, si_email, si_region, si_phone</td>
</tr>
</tbody>
</table>

The flowchart is given in Figure A1. Some of the screen shots are given in Figures A2-A5. FruitWorld.com has three interfaces: one for buyers, one for sellers and another for administration. Both the buyer and the seller must register and wait for authentication by the administration. The opening screen provides links to sites (either commercial or non-profit organization) having cultivation-related information, nutritional and health-related information, and information about the processing industries. These links along with the advertisements to the right may generate income for the marketplace through promotions. Buyers and sellers can log in separately. After logging in, the buyers can search and view items for sale (Figure A2) and may register an "intention for transaction" by adding to shopping cart (Figures A3). Such a deal may be further negotiated through other online or offline channels before confirmation (Figure A3). The e-marketplace dynamically updates the product information. Similarly, the sellers can put items for sale from any region. The various Web forms display and provide access to information such as fruit type, variety, price, condition, volume, buyer/seller information etc. and eventually display an invoice for a possible transaction. The shopping cart holds such "intended deals" until they are "finalized" (Figure A4) by the seller. At that instant, the market information is updated. The administrators have an exclusive interface (flow chart is not shown due to page limitations) and log-in procedure for managing the content as needed (Figure A5).

Figure A1: FruitWorld.com – Part of the Flow Chart
Figure A2. List of items for buyers to check after a search

Figure A3. “Intended order” is added to cart and recorded. Actual numbers may change after negotiations

Figure A4. Seller views the order and may finalize, edit or remove it from the order list. After ‘finalise’, the quantities are updated in the market database.


