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Impact Factors For Mobile Internet Applications In The Agri-food Sectors

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Abstract. Mobile communication and the mobile Internet can provide important opportunities, economic advantages for enterprises end organisations and support their more efficient operating as they can be used anytime and anywhere. We can make their wide spread use, innovative effects and advantages economical if we consider the effect system of technologies and services. The technological, social and economical complex effect system puts a pressure on the spreading of business applications. The types of applicable equipment are increasing. According to social aspects there are four player groups: manufacturers, enterprises, customers and workers. The Internet technology and the Internet network have become essential communication tools in business processes recently. Using the Internet by means of mobile appliances increases the possibilities. By studying the business process the expenses, advantages, disadvantages can well be seen. Nowadays these applications are more and more successful in areas such as agriculture, different parts of the food industry, extension services, precision agriculture and logistics. It can be stated that the international and the Hungarian development tendencies of the mobile Internet, the RTD Programmes of EU help the wide-spread use of mobile services. The rapid development of the Hungarian domestic mobile market over the last years is the basis for the wide spread use of new broadband mobile services and applications. This system can contribute to the development of agriculture, enterprises and rural areas and can support production, commerce, services and product tracing. But for successful applications we have to consider the impact factors.

Keywords. Mobile Internet, mobile application

Introduction

New applications of mobiles are constantly developing, as GSM networks are well deployed across the globe, we are currently investigating whether and how these networks could be used for early warning of the public of an imminent threat or disaster, and what further actions would need to be taken, for instance to ensure a harmonised implementation of cell broadcast across the world's GSM networks and phones. But now, as 3G services are being launched apace, we are beginning to see these services for real (Reding 2005). Mobile communication and the mobile Internet can provide important opportunities, economic advantages for enterprises and organisations and support their more efficient operation as they can be used anytime and anywhere. We can make their wide spread usage, innovative effects and advantages economical way if we consider the effect system of technologies and services. The technological, social and economical complex effect system puts a pressure on the spread of business applications.

Driving forces for m-commerce

At present mobile communication is driven by different factors (Figure 1):

- Firstly, there are social development trends. M-commerce provides an opportunity for private or business communication anytime and anywhere.
- Secondly, there are transmission technology-related driving factors. Not only will we experience voice transmission of a quality comparable to a fixed line, we will also have mobile access to Internet and to other Internet Protocol (IP)-based services and applications.
- Thirdly, there are economic drivers. Positive network externalities, attractive content, low costs and reasonable prices of the mobile services, substitution possibilities and other factors are contributing substantially to the market growth.

Based on these driving forces, we expect the mobile environment to be the next market, attracting the attention of a large number of diverse and global players. (Buellingen, Woerter, 2004)
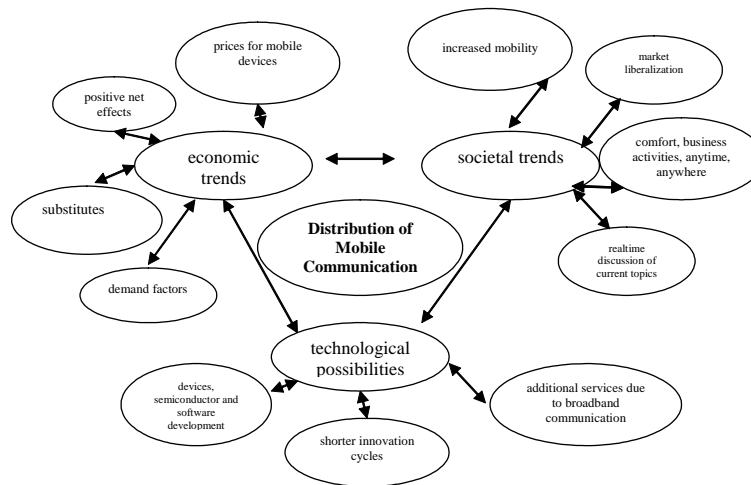
Figure 1. Drivers for mobile communication (Buellingen, Woerter, 2004)

Relevant social groups

Mobile communication technologies are still at a very early stage of development. (Dholakia, Zwick, 2004) Like the rest of the edifice of the New Economy, the ''mobile future'' is built on a foundation of promises. RSGs (Relevant Social Groups) in most cases device manufacturers, application providers, or network operators are to be seen as rhetorical tools to funnel the attention of other RSGs such as business customers, end users, and policymakers into particular interpretive channels. The key point is whether the RSGs see the problem as being solved. Until now, the formulation of the problems that new communication technologies need to address have almost entirely emanated from the powerful cultural, economic, and technological core of Western Europe and North America, resulting in a focus on individual consumption and worker/business productivity. The range of user benefits promised by the developers and marketers of new mobile technologies begins to mimic the ideal of the tech-savvy, autonomous (male) protagonist of the science fiction narrative.

At the production end consumer groups have constructed two main themes (problems) of mobility. These are:

- the omni-powerful consumer,
- the ultra-productive worker.

These interpretations of the technology are challenged by two other themes:

- privacy,
- worker surveillance.

Initially there is a high degree of interpretive flexibility associated with new mobile communication technologies. This perspective helps represent the ''seamless web'' of meaning-creating-and-constructing actors who compete to install, and instil, contesting meanings of the same artefact.

Strategic implications of mobile technology

The main drives for the company to adopt mobile technology are to 'increase efficiency' and 'provide better customer services', which are two key dimensions of competitive advantages (Sheng et al., 2005). The relationships between means objectives and fundamental objectives demonstrate how mobile technology strategically impacts the organization. Based on the means-ends objective network they identified three main strategic implications of mobile technology: (1) improving working process; (2) increasing internal communication and knowledge sharing; and (3) enhancing sales and marketing effectiveness. These implications can help to strengthen and achieve company strategies.

Mobile Internet technology and impact of IT

There are two main mobile internet technologies in use nowadays: third-generation mobile (3G) and wireless local area networks (WLAN). 3G is a technology for mobile service providers. Mobile services are provided by service providers that own and operate their own wireless networks and sell mobile services to end-users, usually on a monthly subscription basis. Mobile service providers use a licensed spectrum to provide wireless telephone coverage over some relatively large contiguous geographic serving area. To support this service, mobile operators maintain a network of interconnected and overlapping mobile base stations that hand-off calls as those customers move among adjacent cells. WiFi is the popular name for the wireless Ethernet 802.11b standard for WLANs.

The benefits effects of IT and mobile applications can be divided into two groups: tangible and intangible effects. (Table 1.)

Table 1 Benefits of IT

Tangible benefits	Intangible Benefits
• Reduced cost • Improved productivity • Increased market share • Savings in labour • Increased consumer surplus	• Improved customer service quality • Improved organizational efficiency • Quicker response to customers • Deeper knowledge and understanding of customers • Improved decision-making ability

Providing information

Management in agriculture is to a large extent to make decisions under uncertainty, the latter being accumulated from three main sources (Thysen 2000):

- uncertainty due to lack of data about the current state of nature;
- uncertainty due to incomplete knowledge about the biological and physical systems and
- uncertainty due to inherently random processes.

Farmers' use of IT must be looked upon from the point of view of farm economics. The majority of farmers will only use IT if they consider this to be economically beneficial. There are, however, reasons to believe that the economical value of IT in farming is increasing, which, eventually, will lead to a higher uptake of the technology. The main reason to expect higher value of IT is the public concern about agriculture's negative impacts on the environment and the widespread fears concerning food safety. These concerns by the consumers are causing governments and the food industry, firstly, to enforce restrictions on the use of assumed harmful chemicals and, secondly, to demand a precise documentation of the primary production process. The general trend for hardware, software as well as connectivity is more value for less money.

Application development

There are already several applications that can be useful in agriculture. For example: GPS-enabled map software, individual cattle identification and tracking software and even complex agricultural systems. These are just beginning to spread in Hungary. Mobile information systems are useful because the user can use the application with the handheld device and search for the required data right on the spot when and where it's needed.

The biggest limitation for PDA is screen size. If it gets smaller, from full screen to PDA-size and even further to mobile phone dimensions, user performance drops. The main reason for this is that smaller screens make it more difficult for a user to make good judgements about the usefulness of any particular information. (Jones et al. 2003)

That means that the developer of applications for handheld machines should keep in mind that his programs will appear on a much smaller display than a regular PC screen. So these applications (and anything that could appear on a handheld display, i.e. web pages) should be adapted to make them more accessible to mobile device users. Here are some guidelines to help the developers create more useable software for handhelds:

Provide direct access

When users are using handheld, small displays they seem to choose and prefer direct access strategies over browsing approaches. So handheld content should be adapted the following way:

- **Providing a search mechanism:** at least one direct search feature must be included in the software or web page.

- **Structuring information for focused navigation:** developers should consider why a user might be accessing a particular page on a web site or a function in the application and present a framework to facilitate such access.

Reduce scrolling

Users have to carry many scroll action using small screen displays. Scrolling can be reduced by:
- **Placing navigational features** (menu bars, etc.) on the top of the pages in a fixed place.
- **Placing key information** at the top of pages.
- **Reducing the amount of information** (only the essential information should be on the screen).

Simple tasks (such as reading or browsing) can be carried out on handheld devices without any bigger complication. However, other tasks that are on higher level than reading (i.e. information retrieval tasks) could be harder to complete on devices having similar display size characteristics to the current models. Because of the size of the handheld screens the application's complexity should be kept low and they should be designed to show all necessary information or menu on one page. Obviously the readability of the information on the screen is very important as well as simplifying data input which is quite troublesome. (Suliburk 2003)

e-Factors in e-Agribusiness

In order to identify government policy initiatives aiming at increasing e-Commerce/-Business adoption for SME's, it is useful to classify the factors influencing adoption and diffusion into two distinct categories: environmental demand factors and direct governance initiatives (Herdon et al. 2006). The term governance is used instead of government, since the former stress the many initiatives are not per see implemented by a government in the narrow sense of the word. The basic idea behind the model is the identification of the major factors, which may retard or facilitate the adoption of e-Business models

Industry structure includes industry concentration, sector distribution, vertical integration, size of firms, and value networks; Information infrastructure includes telecommunication, wireless and Internet infrastructure, technology access and use, and technology acceptance; Financial and human resources include payment mechanisms, venture capital, population, wealth, income distribution, age, education, and IT skills; and Social/cultural factors include consumption patterns, consumer preferences, business culture, investment levels, and language.

Technological and organizational factors are the most commonly recognized and analyzed parts of the e-business model adoption process. Technological factors are more or less externally indicated, and the company must consider them as factors in different business models that are closely dictated by external factors, e.g. the state of technological development, user preferences and expectations, and competitive environment.

Individual Thematic Priority Business models are conceived, implemented, adopted and evolved by individuals and organizations or rather groups of individuals. Consequently these models aim to service individuals or groups thereof. It is therefore apparent that the individual plays a central role in the "sustainable adoption" of e-Business models. Moreover, an e-Business model should accommodate and anticipate the behaviour of consumers. In addition, one should also be reminded that an organization is an organic collection of individuals. Hence, one should realize the importance that individuals play in the evolution of an organization and its business model.

Organizational factors: The adoption and subsequent performance of business models for e-business require much more than just "jumping on" the latest technologies. An enterprise would have to consider or reconsider what kind of business they are in, what products and services to sell, how they should serve the market, how they should organize their business processes, and how they could exploit new and promising virtual partnerships.

Sectorial factors: Adoption of e-business models is influenced by the sector structure and vice versa. However, not every industry faces the same changes in its structure as a result of doing e-business. The amount of Internet use within an industry branch or sector is not only reflected in the nature of the product (e.g. digitized products such as music, books and software are easier to sell and distribute over the Internet) but also in consumer tastes and habits. Products with a high level of services are perfectly suitable to create a relationship with the consumer by personalization. This characteristic stimulates the adoption of the business model. Furthermore, the potential of products that are digitalized is bigger than non-digitalized products.

Societal e-factors are those related to the general context within which new e-business models are formulated and adopted.

Related European projects

Analysing Broadband Access for Rural Development (A-Bard 2005) is a 6FP Coordination Action to research rural broadband provision and use. A-BARD project objectives and goals the following: A-BARD aims to identify emerging results and experience in order to focus and leverage emerging results from on-going RTD, mobile applications and services deployment and ICT take-up. Specifically the research aims to Focus and enhance awareness and understanding of the benefits of mobile applications and services deployment in rural areas.

The WirelessInfo project (Wirelessinfo 2002) main objective was to implement advanced wireless communications for rural applications. The target applications areas were state forestry information systems, state agriculture information systems, forestry consulting information systems, agriculture consulting information systems oriented mainly on precision farming, forest owner system, farming information systems, land management, water management. The WirelessInfo project was trials project, so the intention was to introduce newest results of research and technological development into new applications areas. The whole project was oriented on the connection of GIS systems (including GPS technologies, remote sensing, photogrammetry, 3D modeling) with wireless communication based on utilisation of 2G and 2.5G networks (GSM, GPRS, HSCSD).

MOSAIC research activity along 2004, in term of vision, is showing new emerging collaborative or shared workspace approaches such as the "People and Network" or "peoplenetworking"- centric approach, which is also related to the so-called on-line communities as well as social networks, and the "process-centric" approach. These new approaches are intended to bridge the gap between performance, purpose, balance and networking within an inclusive, innovative and interconnected workplace. This combination of *inclusive*, *innovative* and *interconnected* is named in short the i[3]Workplace. The main results of the project survey focused on the following question groups: The social perspective (Human aspects in Mobility), The Workspace perspective (Mobility and work settings), The Service or business perspective (Mobile applications & services), The Platform perspective (Mobile services platform & awareness), The Technology perspective (Mobile access technology), The Legal perspective (Mobile policy & regulation). (Schaffers 2005).

In our survey we compared our results to some part of MOSAIC work. We had got similar rate of the answer to MOSAIC Survey. Some human aspects are shown on Figure 2.
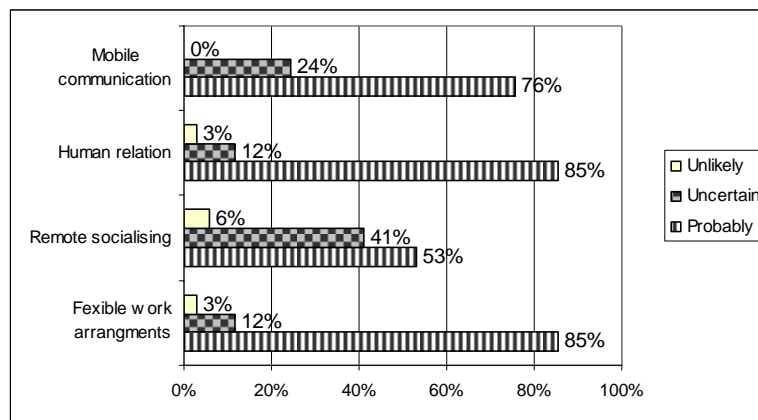

Figure 2. Human aspects of mobile communication (Hungarian survey by Szilagyi 2006)

Agriculture applications

Mobile Internet can use for data acquisition. It is more flexible and easier to use. (Chanet et al. 2005) These new systems can be used on several equipments. In the recent years, the apparition of the PDA and the wireless communication technologies (Bluetooth and WiFi) have opened new perspectives in the topic of data acquisition. In a such way, in agriculture, they will soon be considered as a common tools as the GPS. The traceability of the products, of the practices and the optimization of the using of the equipments are now very important for agriculture.

The Eurovet livestock traceability solution (E-blana 2003) is good example for modular application. It

supports animal and herd registration, tracking and tracing, animal health surveillance and veterinary public health monitoring. The traceability system offers a number of benefits to national veterinary services and departments of agriculture including: Food Chain Protection; Improved Animal Health Crisis Management Capability; Adaptable to changing requirements; Integration with existing systems; Accurate and timely data; Increased efficiency.

According to our studies (examining practical applications, research works funding by EU and our developments (Szilagyi 2005) we can say that the mobile Internet applications will be wide used in agriculture, but we have to consider the driver effects. These effects can be studied by living labs efficiently.

Conclusion

Changes in technology will proceed with organizational and social change. The rapid evolution of hardware and software devices will increase consumer demand for timely and accurate information. If current trends in wireless broadband technologies continue, it is likely that, in the medium term, demands, beyond data, for on- field best management practices will increase rapidly. (Zazueta, Vergot 2003) These developments, coupled with the rapid advances that are being made in human computer interfaces, are likely to make IT ubiquitous, enabling access to dramatically increased amounts of data, tools for analysis, and decision support systems.

References

A-Bard. 2005. Analysing Broadband Access for Rural Development Project, http://www.a-bard.org

Buellingen F., Woerter M. 2004. Development perspectives, firm strategies and applications in mobile commerce, Journal of Business Research No.57, 1402-1408 p.

Chanet J.P., Boffety D., André G., Humbert T., Rameau P., Amamra A., Sousa G., Piron E., Hou K. M., Vigier F. 2005. Wireless Technologies for Field Data Acquisition, EFITA/WCCA 2005 25-28 July 2005, Vila Real, Portugal, ISBN 972-669-646-1, 681-686 p.

Dholakia N., Zwick D. 2004. Cultural contradictions of the anytime, anywhere economy: reframing communication technology, Telematics and Informatics No.21, 123-141 p

E-blana (2003): Livestock Traceability Solution, Solution Blueprint

Herdon M., Zimányi K., Péntek Á. 2006. e-Factors in e-Agribusiness, XII. European Conference Information Systems in Agriculture and Forestry on Through scientific development to prosperity 2006 16-17 May, Prague, ISBN 80-213-1494-X

Jones M., Buchanan G., Thimbleby H. 2003. Improving web search on small screen devices, Interacting with Computers 15, 479–495 p.

Lehr W., McKnight L.W. 2003. Wireless Internet access: 3G vs. WiFi?, Telecommunications Policy No.27, 351–370p.

Schaffers H. 2005. Understanding Innovation in the Mobile Workplace, Mosaic network publication http://www.mosaic-network.org

Sheng H., Fui-Hoon F. N. Siau K. 2005. Strategic implications of mobile technology: A case study using Value-Focused Thinking, Journal of Strategic Information Systems 14, 269-290 p.

Suliburk J. 2003. Which Handheld Should I Buy?, CURRENT SURGERY - Volume 60/Number 1 - January/February

Szilagyi R. 2005. Mobile based Internet applications and their impacts for farms. PhD Thesis. University of Debrecen.

Thysen I. 2000. Agriculture in the Information Society, AgEng 2000, 2-7 July 2000, http://www.idealibrary.com

Reding V. 2005. Mobile Communications: A key driver to make Lisbon succeed. 3GSM World Congress 2005. Cannes, 14 February 2005 http://europa.eu.int/rapid/

Wirelessinfo (2002): http://www.wirelessinfo.cz

Zazueta F.S., Vergot III P. 2003. Use Of Handheld Computers In Agricultural Extension Programs, EFITA 2003 Conference, Debrecen, Hungary