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THE DUAL ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN ENHANCING SERVICE INNOVATIONS

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Abstract: The paper presents roles of information and communication technologies in innovation processes in services. Research method has been a case study due to the lack of empirical studies of innovation processes in Serbia. The paper analyses four original service innovation projects which have been conducted in Serbia based on ICT enhanced innovations. The main findings affirm that ICT progress per se enables new ways of gathering, processing, keeping and transferring information in services and also in that way enables base and impulse for innovations. Beside this, new findings also show that ICT have considerable role in the very process of innovation, from an idea, development and testing to commercialization. The paper points out key ICT methods and tools which can be used in different stages of innovation process.

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Introduction

Accelerated technological progress, diffusion of technological innovations into various activities and challenges of market competition have brought a lot of novelties in the area of services. Changes are constantly happening on the level of services in general as well as on the level of individual service and production organizations which are working on enhancing services by implementation of new technologies. Nowadays it is possible to notice that service sector has exceeded production sector in all developed economies (both in employment and output). Traditionally technology used to be seen as a key to productivity of production activities, but today it has greater influence in services and leads to efficiency and effectiveness of this sector. Technological improvements have lead to more complex services and therefore in modern conditions it is normal for services to be offered with complementary products. As a result organizations in various areas of activities have been paying more and more attention to intensifying research and development and innovation activities in services. In turbulent economic environment, business competition and performances are associated with topics like quality of services, experience in creating new values for buyers, use of ICT, management of customer - CRM relationship, personalization of services and customization, intercultural understanding and meeting customers' needs (Sigala and Christou, 2006). In traditional production organizations management becomes aware of significance of services in product-service mix, that is in an offer they put on the market. Additional producer's service often becomes key advantage in competing. In that way service is recognized as variable which determines not only success of organization on

the market, but also prospects for future development.

Specific characteristics of service development

Service innovations require new investments, with the goal to create services that will have lower costs (efficiency), and/or will be focused on specific customer requirements (effectiveness). Improving and developing service operations should lead to (Levi, 2010): growth and differentiation of service quality, reduced costs and greater responsiveness. Influential factors that motivate organizations to create and develop new services are various. Following key factors can be recognized (Haksever et al., 2000): meeting clients' needs (new or altered), financial goals, actions of competitors, globalization, technology, regulation/deregulation, and elimination of restrictions on professional associations, the growth of franchising, balancing supply and demand.

Services have unique characteristics compared to the product, which can be a source of new development opportunities. Characteristics of services emphasized in the literature (Looy et al., 2003; Tidd and Hull, 2003; Levi, 2010; Green et al., 2001; OECD, 2005) are: the intangible nature of output, close interaction between service creation/production and service consumption, and heterogeneity of services. When considering the introduction of new services to the market, it should be considered that users can not review the services before the consumption. Service quality and customer satisfaction in contact with new service will depend largely on the preparedness of personnel and procedures that provide the service. Since the service requires interactivity, the services in the past were provided on a small scale and local basis. The development of ICT networks has enabled the spread of potential

users of certain services and provided the basis for their further development. Four main purposes of the application of technology in services can be distinguished (Haksever et al., 2000): processing users, processing users' assets, information processing and creation of new services.

ICT and service development

Development of information and communication technologies (ICT) and expanding the possibilities of their application can be considered a major feature of development of modern society. Today, the ICT sector provides about 10% of GDP in all OECD countries, with an upward trend in the share of GDP (ICT 2020, 2007). According to the reports by the OECD, investments in ICT have resulted in annual growth of 0.3% to 0.8% of GDP over the past 10 years. Compared to an overall increase of 2% of European GDP, it is a significant share. (Janssen and Starting, 2008) This sector has become the driver for development of different areas and sectors, and contribution is reflected in the fact that ICT (Kramer et al., 2007): reduce transaction costs and thereby improve productivity; offer immediate connectivity (voice, data, visual) improving efficiency, transparency and accuracy; substitute for other, more expensive forms of communicating and transacting; increase selection on the market and provide access to otherwise unavailable goods and services; widen geographic scope of potential markets; channel knowledge and information of all kinds. The ICT sector has undergone expansion over the past two decades, with extremely fast growth rate of technological innovation, and the number of market participants. The five largest EU economies (DE, UK, FR, IT, and ES) accounted for 2/3 of total employment in both ICT manufacturing and services in 2005 (Turlea et al., 2009).

In technology intensive areas competitors quickly respond to offer new products and services, although the time of product and period of service development is shortened and the costs of technological development are growing (Tyler, 2001). This is particularly true in the field of ICT, where services are often very difficult to protect from imitation. ICT market participants are forced to continuously and intensively work on identifying, developing and protecting their sources of competitive advantage, with a continuous learning process. Development of products and services supported by ICT requires a different set of knowledge that must be applied in the development process. Products are more and more multitechnological (e.g. mobile phone). Therefore the case of services that can be offered requires a much larger set of knowledge and competence than it was before. According to Janssen and Starting (2008) ICT industry, especially its most promising part - the software industry is characterized by rapid growth and

technological change, low entry barriers, the possibility of global participation, a large number of small businesses, especially in developing countries, extensive interconnection of producers and users, the importance of local users or domestic markets, strong networking effects or effects of the clusters and the high intensity of research and development.

The development of ICT has led to the emergence of new forms of interaction and communication in the manufacturing and service companies, or new ways of conducting business operations. In addition, the development of ICT has led to altered and intensive interaction between providers and users, but also to the emergence of some entirely new services. Understanding and monitoring trends in ICT development, and implementation of new ICT in business of manufacturing and service companies, today becomes a continuous activity for both researchers and management. Experts have announced the presence of a clear trend for the next five years - more growth will be primarily driven by several innovations such as ICT equipment and technology of broadcasting, in the EU slower growth of 2% is expected. Higher growth rates are expected for efficient modular software and ICT services that are tailored to companies and individuals who are projected to become increasingly sought-after in Europe and worldwide, with growth of at least 6% (ICT 2020, 2007). In the following period the software can no longer be viewed solely as a technology support, but as one of the key elements of the incorporated in business. In this context, software refers to the changes in the service provision (Janssen and Starting, 2008). Some of the changes that have been overlooked like more involvement of end users in defining and organizing services to replace the approach that was provider oriented, significant dynamics of services will lead to a re-definition and configuration: the focus will be on the services design according to business needs, rather than a posteriori alignment of business and ICT. Various software packages and services represent themselves as such and are applied in public administration, financial services, health organizations, education, tourism, entertainment and more.

From the aspect of Serbia's economic development, services that are enabled by information technologies represent one of the fastest growing areas of global import-export economy. (Nacionalna, 2005) The importance of the ICT sector in Serbia can be recognized by the fact that 70% of the workforce in the IT sector have a university degree, that there is more than 2700 innovative ICT companies and that the fourth Microsoft development centers has been opened in Serbia. ICT is one of seven national priorities in the field of science and technology. In recent years a number of service innovation were introduced based on ICT development that have significantly affected the

quality of life. Organizations in Serbia show a very high potential in development and implementation of service innovation based on ICT. This is helped by innovative local ICT companies, and also high percentage of the population educated in tertiary sector (20.84%, while in the EU more than 21%). By strengthening innovative potential Serbian organizations strengthen their negotiation power with businesses in the international environment and create preconditions for entering the global market.

ICT enhancing innovation process

The research conducted for this study included four projects to develop new services which are *me-too* innovation, and services that are already present in developed countries, but are new to the Serbian market. Open-source models and strategies of imitation were used in response to innovations that had already been introduced into the environment. Thanks to more global nature of the telecommunications sector, the idea has quickly spread and imitation and adaptation of successful products and services has become a universally accepted innovation strategy (Van Riel and Lievens, 2004). In addition, a common feature of all projects has been the need to develop high-quality and reliable service fast. The need for shortening the development time, for using the latest knowledge and technologies in the field of ICT and the pursuit of linking competence have been the main reasons for linking the large and well-known service providers with a small software companies. Projects that are the subjects of case studies are the following.

Project 1 - Development of teletext system:

Four companies participated in this project: the leading television and one of the leading bookmakers, as service providers, and two smaller companies that worked on software and hardware development. A complete solution was developed which has several advantages: it is based on open source technologies, so that no additional licensed software was needed, teletext editor allowed easy creation of pages, and user-friendly interface reduced the required technical knowledge to a minimum. Update the page was done over the Internet, which is of particular importance to bookmakers, due to the extremely dynamic data. Teletext made and sold on turnkey bases very quickly won the domestic market. It now covers 100% of the Serbian market and it is present in all ex YU countries (Montenegro 100%, Macedonia 100%, Bosnia and Herzegovina 70%, and it is present in Croatia and Slovenia) and also in Cyprus.

Project 2 - Development of traffic cadastre:

This project resulted from the evident need for introducing modern ICT in the process of recording, monitoring and maintenance of traffic signals. Shortcomings of the existing system related to the paper form of all

maintenance documentation, made it impossible to effectively carry out monitoring and to control costs. The participants in the project were a municipal body in charge of Belgrade transport, as a service provider, and a smaller software firm which had developed the system. The new solution had accessible and understandable interface that was tailored to the user needs i.e. for the purpose of effective and timely maintenance.

Project 3 - Development of live betting:

Service provider had to develop a system that enables real-time insight into the games that were played in about 200 betting shops in different parts of the world. The participants in the project were leading provider of betting services and a small software company. In the new system all payment centers were associated with the main server and checking of each ticked was done in real time. Betting offer was variable and client could make the offer, or could buy already predefined. Various types of financial statements could be made at any time. The new system supported standard betting, live betting, while the Internet betting was still under development. At the end of 2009 the new system was used at 250 sites in 7 different countries (Serbia, Montenegro, Bosnia, Lithuania, Romania, Cyprus and Tanzania).

Project 4 - Development of mobile marketing via Bluetooth technology:

Development of new service was done through cooperation of recognized mobile operator and a small software company. Mobile marketing is a new type of advertising, which complements existing channels and brings many advantages: speed in response of advertisers, direct access to the user/ purchaser, accurate statistics on the response to specific actions and campaigns, reported user response to specific topics and possibility of collecting additional data about users directly via mobile phone. Benefits for a user are real-time information, location-specific information (via Bluetooth hot spot), collecting points, discounts on purchase, participation in games, free multimedia content etc.

Four listed projects were the subjects of the study. After detailed analysis of projects' documentation, we conducted the interviews with project managers in order to determine the use of ICT in innovation process - from the initial idea to commercialization. The phases of innovation process were presented in the literature (Cooper, 1990; Scheuing and Johnson, 1993; Haksever et al., 2000; Marinkovic, 2010). Looking at the four projects through all phases of the innovation process, and timelines analysis using a Gantt chart, the common characteristics were identified relating to the role of ICT (Marinkovic, 2010). First of all, it was noticed that the service innovations were based on ICT development and implementation of highly interactive, so the innovation process alone was hard to be presented by linear series of stages, since there were many overlaps between the phases. Projects implied the involvement of

several organizations of different sizes and industries, all of them had in common the fact that they were creating a new service aimed at customer satisfaction by providing quality services on time and with acceptable costs. Analyzed project demonstrates that service innovation resulted from systematically conducted processes. This conclusion is consistent with the theory that emphasizes the need for an infrastructure for innovation (Bygstad and Lanestedt, 2009).

The key actors in innovation projects were technical services and engineers of services provider, as well as external collaborators and small firms that worked on ICT development for new service. These participants conducted an intense, almost daily communication with the support of ICT, from the idea generating phase to the commercialization. This intensive, technologically supported communication is present today, in the phase of implementation and maintenance. User involvement with the support of ICT was present at certain stages of the process, partially at the stage of generating ideas, but primarily in the testing phase. The dynamics of markets and rapid changes in the monitored areas also left a great time to research the needs of users and their planned and organized participation in the process of generating ideas. This confirms the claim (Van Riel and Lievens, 2004), which indicates that marketing research is not always justified and useful information can be gathered in future phases of development by users involvement in the development process and testing. ICT have enabled generating of ideas related to service as output simultaneously with the process of generating ideas about service delivery. Unlike the development of services, in the case of product development, we first developed the concept of products, and then designed the manufacturing process. Activities of generating and selecting ideas overlapped, particularly the inclusion of ICT professionals in the process. (Marinkovic et al., 2011) Their knowledge of technological possibilities and limits to the proposed idea influenced the selection process. The results are consistent with studies that confirm that interaction between providers and clients, and ICT professionals have an equally important role in promoting various forms of innovation services (Gago and Rubalcaba, 2007). It was noticed that the competence of individuals or teams to define customer requirements, and those who translate those requirements into design requirements were essential for the performance of the innovation process. These phases were important in terms of the project, as well as in terms of quality of development system which is to meet the requirements and expectations. At this stage extreme precision and understanding between the parties involved is required, so you need to carry out intensive consultations on all disputable issues (Marinkovic et al., 2011. In

this case is important the use of modern ICT in communication.

The development of the ICT system that is based on the new services is the phase that requires a certain amount of time during which the development activities of the current system are done separately from current business of service provider. In this period it is necessary to appoint people in the provider's organization who will be there to give quick answers to questions of software engineers during the development of the system. During and after development, the traditional market testing may not always be necessary and in some cases it is even impossible. Testing of new services is commonly referred to internal testing of software, when testing modules are used. In addition, testing is performed on a selected group of users in the form of beta testing, again with support from ICT. In the process of introducing new services to the market, it is important to provide adequate information about the benefits that users can expect from new services, taking into account the specific nature of services. It is necessary to ensure the conditions for accepting the service. According to the literature, (Evangelista, 2006) ICT has a special role in adapting to services, and special attention should be paid to factors affecting ICT adoption. Phase that is crucial for the acceptance of innovation in end-user services is the commercialization stage when promotion of new services supplying users with instructions. Promoting new services in four projects observed was done by the Internet, social networks, Bluetooth technologies and different forms of TV and video promotions. According to the study of innovation in the financial sector (Wei et al., 2006) the use of information technology in this area must continue to increase, because it is a particularly important factor in technology to accelerate the transfer of knowledge and develop relationships with clients. The study in this paper confirmed that the introduction of new services based on the application of ICT influenced on developing relationship of trust and consumers loyalty. It is shown that modern technologies allow new forms of communication and interaction, both between participants in different stages of the innovation process and the innovating organization and the environment. Newer research papers are trying to determine the existing forms of communication and discussion on the Internet, as well as the possibility of their use as sources of information for innovation services. The results of qualitative studies (Andreassen and Streuknes, 2009) identified four categories of topics and their sub-topics that are important source of information for innovation processes in services. Modern technologies can be used for customer relationship management. Currently they are Customer Relationship Management - CRM software, by known companies Compiere Inc. and Sugar CRM. Project management software

is also widely applied (e.g. Microsoft Project), as well as various software for testing at certain stages of development. The findings obtained on the basis of available literature and the study of four real innovation projects in services indicate that there is a variety of tools, techniques and

methods for application of modern ICT in the innovation process. If the phases of the innovation process are presented by three groups of activities (Marinkovic et al., 2010), review of ICT support in each group is shown in Table 1.

TABLE 1. ICT ENHANCING SERVICE INNOVATION PROCESS

Groups of activities	Contemporary ICT that can be used
New service creation	Intranet: communication between involved teams Internet: on-line forums, newsgroups Internet: websites, demographic data, competition analysis, market trends analysis... Idea management software (e.g. Hype IMT, Jenni) Call centers for customers complains and compliments CRM (Customer Relationship Management) software ERP (Enterprise Resource Planning) software
Development of new service based on ICT application	Intranet: communication between involved teams Software for versions control (SVN-Subversion) Softer for automatically testing and building (translating source code into executive Software for bug tracking and activities tracking (Trac) Software for monitoring clients' demands and complaints (Issue Tracker, e.g. Request Tracker) Project management software Open source CRM software
Introduction and commercialization of new service	Intranet: communication between involved teams Internet: communication between provider and clients Internet: launching and promotion via websites, e-mail, virtual stores, to research the price and promotion options TV and radio advertisements, Teletext Mobile marketing, Bluetooth technologies Call centers for informing and instructing end users CRM software

Source: Marinkovic (2010).

Research has shown that ICT enhance service innovations, as ICT enable faster development processes and greater responsiveness to market demands. Introducing ICT in innovation process allows faster identification and development of potentially profitable ideas; the risks are lower, because unrealizable ideas can be detected at early stages, as well as the need for their modification. Through ICT ideas, views and reviews from various sources are integrated. Those sources are users, designers, engineers, marketing and PR experts etc. ICT enables more efficient testing and modification of new solutions. Through various forms of communication with users, ICT contribute to introduction of ICT innovations on the market, to the efficiency of maintenance and to developing a relationship of trust with end users.

Conclusion

Dynamic markets with short life cycles of products, services and processes demand

shortening of development time, that is shorter and more efficient innovation processes. Thanks to new technologies buyers and consumers are becoming better informed. Their expectations and demands are getting bigger in terms of given services. Personalized service is what is expected from modern providers. Processes of creating new services are changing as a result of technological development and new forms of communication. Therefore service organizations have to use all available opportunities, especially technological, in order to enter the market at the right moment with a service which meets consumers' demands. Role of ICT can be perceived in two ways. First of all with its possibilities ICT represent incentive for development of existing and implementation of new services on the market. Secondly, ICT are obligatory part of innovation process which can be present in different stages. In this area further empirical researches are expected. It would be particularly important to study and measure effects of implementation of ICT in innovation process on success of new service on the market, as well as on sustainability of new

solution. Findings in various areas of services can be compared and general patterns can be determined, as well as in individual services, having in mind wide variety of this sector.

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