Diffusion,
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DIFFUSION OF INNOVATIONS: FOCUSED ON E-COMMERCE

This paper investigates the issue of diffusion of innovations focusing e-commerce diffusion. Diffusion refers to spreading of an innovation within and across organizations. In this article there is a brief history of diffusion research described and theoretical introduction for the diffusion of innovations stated. The global diffusion of e-commerce is a process driven by a variety of forces. In this paper two diffusion models related to e-commerce are described, which could help us better understand the spread of innovations throughout the system.

DIFÚZIA INOVÁCIÍ: ZAMERANÉ NA E-COMMERCE

Príspevok sa zameriava na skúmanie problematiky šírenia inovácií s dôrazom na rozširovanie služby e-commerce. Difúzia sa týka šírenia inovácií v rámci jednotlivých organizácií. V článku je stručná história rozširovania služby e-commerce, ktorá bola predmetom predchádzajúcich výskumných prác a teoretický úvod k difúzii. Globálne rozšírenie elektronického obchodovania je proces, ktorý ovplyvňujú rôzne sily. V príspevku sú uvedené dva modely vo vzťahu k rozširovaniu e-commerce, ktoré sa zameriavajú na difúziu inovácií v celom systéme a pomáhajú pochopiť proces šírenia inovácií.

1. INTRODUCTION

In the last years, the diffusion of e-commerce has been extensively studied both by academics as well as practitioners. Electronic commerce or e-commerce is the mode of commerce wherein the communication and transactions related to marketing, distributing, billing, communicating, and payment related to exchange of goods or services is conducted through the Internet, communication networks and computers. The Internet compresses time and space, making it easier for companies to expand. But we should remember – what happens in one country or region may not happen in another.

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The spread of an innovation in a market is termed “diffusion”. Diffusion research seeks to understand the spread of innovations by modelling their entire life cycle from the perspective of communications and consumer interactions.

2. DIFFUSION THEORY

2.1 A brief history of diffusion research

Research on the diffusion of innovations started during 1940s and 1950s. Researchers studied separately one kind of innovation; for example rural sociologists investigated the diffusion of agricultural innovations to farmers, while educational researchers studied the spread of new teaching ideas among school personnel. Despite of these approaches, each of them uncovered remarkably similar findings, for example, that the diffusion of an innovation followed an S-shaped curve over time. [1]

In 1971 Rogers with Shoemaker started to compute an index of cross-tradition citations for diffusion publications, which was a starting point for creating diffusion research traditions. This trend toward a more unified cross-disciplinary viewpoint in diffusion research continues today. The communication tradition of diffusion research in one of the number of diffusion publications and one of the fastest-growing. By 1962 when Rogers published his famous *Diffusion of Innovations*, there were only few diffusion publications in this field. One difference from the diffusion of other innovations is that news spread much more rapidly. [1]

2.2. Bass Diffusion Model

Traditionally, the main thread of diffusion models has been based on the framework developed by Bass (1969). The original Bass model was introduced primarily as a tool for forecasting sales of new products.

The Bass Model shows how a new product or idea spreads through the user community. According to Bass when an innovation introduces and the adoption population is zero, the only source of adoption will be external influences such as advertising. The advertising effect will be largest at the start of the diffusion process. The model assumes that potential adopters of an innovation are influenced by two types of communication channels: mass media and interpersonal channels. [4]

Individuals adopting a new product of a mass media message occur continually throughout the diffusion process and they are concentrated in the relatively early time periods. Individuals adopting because of interpersonal channels expand in numbers during the first half of the diffusion process and decline in time creating S-shaped curve.

Bass model is a predictive model that helps to forecast how many adoptions will occur at future. (Fig. 1)

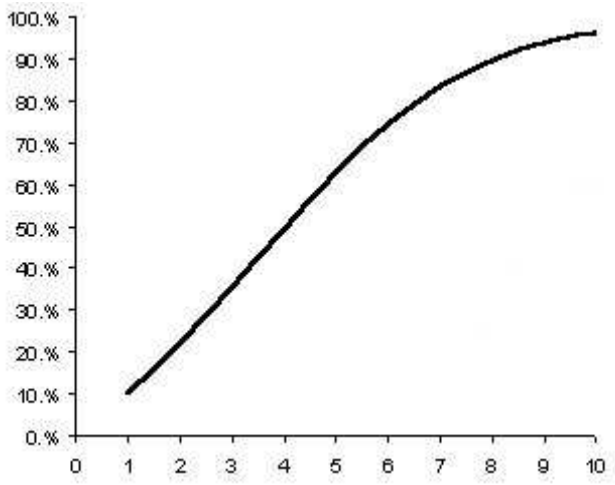

Fig.1. Bass Diffusion Model

2.3. Rate of Adoption

"*Rate of adoption is the relative speed with which an innovation is adopted by members of a social system"* (Rogers, 2003). Generally, it is number of individuals who adopt a new idea in a specified period. Most of the variance in the rate of adoption of innovations (from 49 to 87 percent), is explained by five innovation attributes: relative advantage, compatibility, complexity, trialability, and observability. In addition to these five perceived attributes of an innovation, there are other variables affecting rate of adoption: the type of innovation-decision; the nature of communication channels diffusing the innovation at various states in the innovation-decision process; than also the nature of the social system in which an innovation is diffusing and last but not least, the extend of change agents' promotion efforts in diffusing the innovation. (Fig. 3) [1]

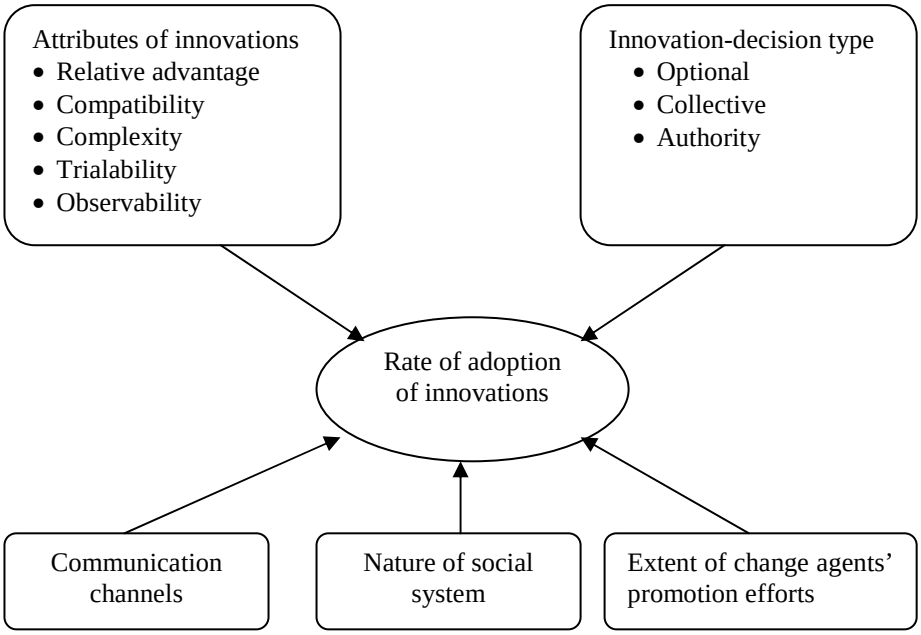

Fig.3. Variables determining the Rate of Adoption (Rogers, 2003)

Innovations requiring an individual-optional innovation-decision are generally adopted more rapidly than when an innovation is adopted by an organization. Also the more persons are involved in an innovation-decision process; the slower the rate of adoption is. The innovation's rate of adoption also may affect the communication channels, the nature of a social system, such as norms, and the degree to which the communication network structure is highly interconnected. The rate of adoption is also affected by the extent of change agents' promotion efforts. [1]

2.4. Adopter Categorization

Product adoption timelines range from a few days to several decades. Adopters are generally categorized into five groups [4, 1]: (Fig. 2)

- ***Innovators*** are a very small group and they pursue technology aggressively. They purchase and use new technologies out of pure interest. Communication patterns and friendship among them are common, even though they may be quite geographically distanced. The innovator must be able to cope with a high degree of uncertainty about an innovation. The innovator must be willing to accept an occasional setback when an idea is unsuccessful. An innovator may not be respected by other members of a local system, but he plays an important role in the diffusion process: he imports the innovation from outside of the system.

- ***Early adopters*** are more integrated part of the local system than innovators. They appreciate the potential benefits of technology and will utilize technology when they need it. This category has the highest degree of opinion leadership. Potential adopters look to early adopters for advice and information. Usually, the early adopter is respected by his or her peers; he decreases uncertainty about a new idea by adopting it.
- The ***Early majority*** adopt new technologies just before the average member of a system. They have interest in technology that is driven by practicality. They will wait and see if a technology fulfils its promises. They want to reference others of the early majority, not just innovators and early adopters before they buy. Their unique location between the very early and relatively late adopters makes them an important link in the diffusion process. Early adopters are one of the most numerous adopter categories, making up one third of all members of a social system. Their innovation-decision period is relatively longer than innovators and early adopters have.
- The ***Late majority*** adopt new ideas just after the average member of a system. They make up one third of the members of a system. Adoption may be caused by an economic necessity or increasing peer pressures. They are sceptical and cautious, the most of the uncertainty about a new idea must be removed before they feel that it is safe to adopt.
- ***Laggards*** are the last in a social system to adopt an innovation. They are traditional and pay little attention to the opinions of others. When they finally adopt an innovation, the innovators have likely introduced another idea. Their resources are limited, so they must be certain that a new idea will not fail before they can adopt. Their precarious economic position makes them extremely cautious.

Adopter categories are the classifications of the members of a social system on the basis of innovativeness – the degree to which somebody is relatively earlier in adopting new ideas than other members of a system. "*The relatively earlier adopters are not different from later adopters in age, but they have more years of formal education, they are more likely to be literate, and have higher social status"* (Rogers, 2003).

Besides socioeconomic status, earlier adopters differ also in personality variables and communication behaviour. [1]

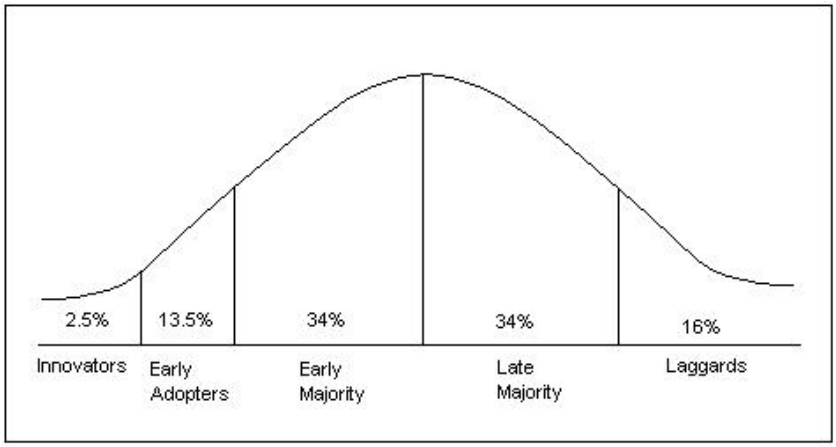

Fig.2. Adopter Categorization on the basis of Innovativeness (Rogers, 2003)

3. E-COMMERCE DIFFUSION

3.1 E-commerce in developing economies

E-commerce diffusion includes diffusion of Internet technologies, telecommunications and the traditional commercial infrastructure. There have been published several research studies dealing with the impact of e-commerce adoption and diffusion of Internet technologies, telecommunications, and traditional commercial infrastructure. The spheres affected by e-commerce include economic productivity, intellectual property rights, privacy protection, and affordability of and access to information (Shalhoub and Al Quasimi, 2006).

The adoption and diffusion of e-commerce continues to grow in developing countries, it could have significant consequences on the social and economic structures of these countries. Compared with developed countries, e-commerce adoption in developing countries has been relatively slow due to more factors, such as obstacles in the on-line authorization of credit cards, inadequate marketing strategies, and small online population. The lack of interest in e-commerce adoption by several groups is also due to unclear price advantages and a poor supply in this shopping mode. The growth of e-commerce has created enormous influence on services, market structure, competition and restructuring of industry and markets. [5]

3.2 Diffusion of e-commerce – global view

There is a conceptual framework (Kreamer et al.; Crito GEC Survey, 2002), which was constructed by adopting the theory and framework of Berger & Dore (1996), and of much innovation research, which asks what environmental and policy variations influence innovation outcomes in different national contexts. [6]

There are two views: one is that the global flows of goods, capital, people, and technology are leading to convergence across countries in the organizations; another view is that the impact of these forces on individual countries will vary according to the economic, political, and social context of the country. It is assumed that e-commerce is a

globalizing force moving all countries toward greater convergence (Cairncross, 1997; Adam et al., 1997; Kenney & Curry, 2000). [6]

It is assumed that the diffusion and impacts of e-commerce use are driven by environmental and policy factors of the local economy, which are in turn shaped by the global environment (Fig. 4). Three dimensions of the framework – global environment, national environment, and the firm – as well as sub-dimensions were derived from the literature on innovation diffusion and e-commerce.

At **the global level**, globalization, trade liberalization, and global competition are driving all countries and sectors toward the adoption of e-commerce.

Factors in **the national environment** may affect innovation outcomes contributing to national diversity in e-commerce diffusion. The national environment includes wealth, industry structure, information infrastructure, financial systems, human resources, social and cultural factors, and consumer preferences.

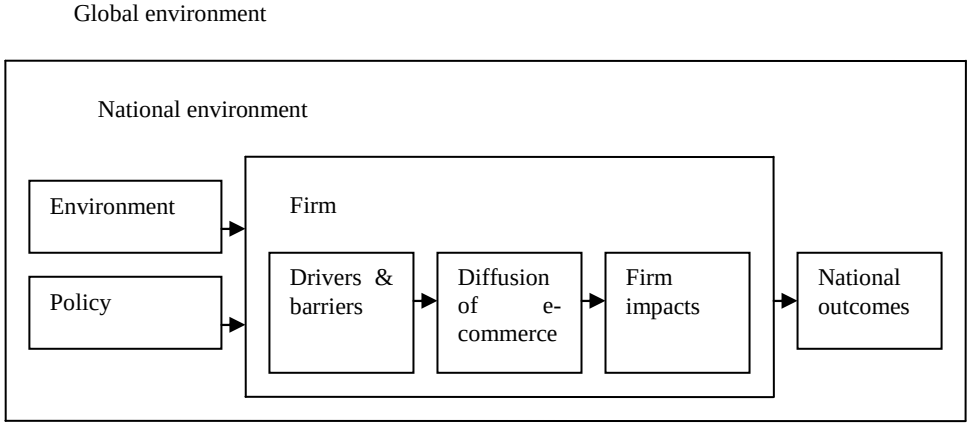

Fig.4.Diffusion of e-commerce - global view [6]

There is a global convergence and local divergence in e-commerce diffusion. Firms in developed countries have reached a more advanced stage than those in developing countries. There are common factors that influence firms in all countries: technological capabilities, competition, trading partner readiness, and regulatory environment.

There is a process-oriented model (Fig. 5), which investigates e-commerce diffusion at the firm level. Innovation diffusion is not limited to one-shot adoption decisions; the process of diffusion consists of multiple stages from a firm's adoption to its use and impacts on firm performance. E-commerce diffusion in a firm is defined as a process from the firm's initial adoption of e-commerce to full-scale use, so e-commerce becomes an integral part of firm's activities. The model shows that e-commerce diffusion is affected by a set of drivers and barriers whose existence and magnitude may depend on the national environment. [6]

Three questions can be reported regarding this model [6]:

- What factors (drivers and barriers) affect e-commerce diffusion in firms?

- How do their effects differ in different environments across developed and developing countries?
- How do their effects vary at different stages of e-commerce diffusion (adoption, use, and impacts)?

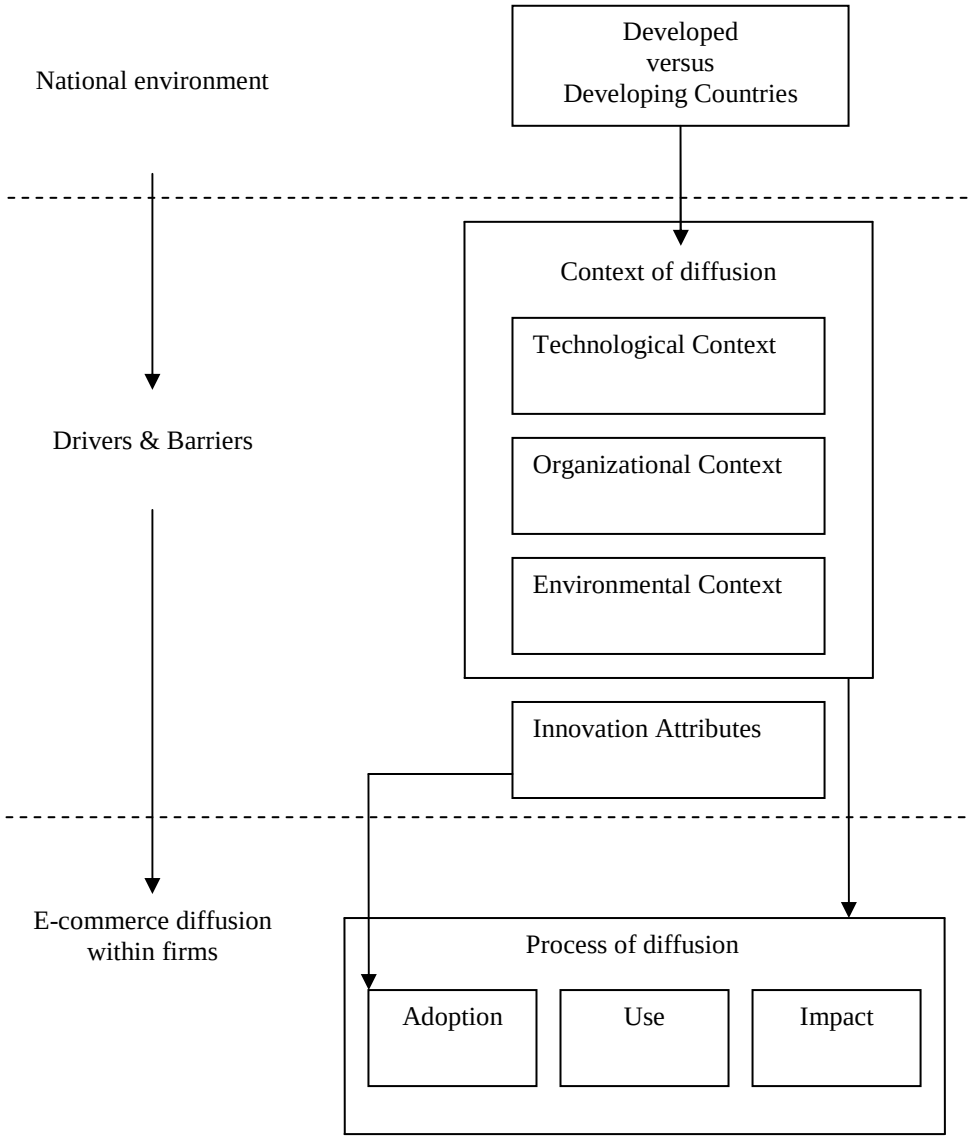

Fig.5.E-commerce diffusion model

4. CONCLUSIONS

Diffusion modelling has been researched extensively for past 40 years. Generally, new technologies are adopted first and most intensively by richer countries, which have financial resources for investments. There have been several researches made, which pointed, that there are differences among countries in level of e-commerce diffusion and different drivers are more important in some countries than others. In this article, there have been two diffusion models described analyzing various factors and levels that influence e-commerce diffusion.

5. REFERENCES

[1] Rogers E. M.: *Diffusion of innovations,* New York, Free Press 2003. ISBN-13: 978-0-7432-2209-9.

[2] Kini R. B., Bandyopadhyay S. K.: *Adoption and Diffusion of M-Commerce,* Indiana University Northwest, 2009. ISBN13: 9781605660547.

[3] Peres R., Muller E., Mahajan V.: *Innovation diffusion and new product growth models: A critical review and research directions,* In *International Journal of Research in Marketing,* Vol 27, pages 91-106, 2010.

[4] Saljoughi, F.: *Adoption of M-Commerce,* Grimstad, Høgskolen i Agder, Agder University College, 2002.

[5] Shalhoub Z. K., Al Quasimi S. L.: *The Diffusion of E-commerce in Developing Economies. A Resource-based Approach,* Cornwall, MPG Books Ltd, 2006. ISBN-13: 978 1 84376 514 1.

[6] Kraemer K. L., Dedrick J., Melville N. P., Zhu K.: *Global E-commerce: Impacts of National Environment and Policy,* New York, Cambridge University Press, 2006. ISBN 978-0-521-84822-0.

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