

DIGITAL ECONOMY, DIGITAL MONEY AND DIGITAL BANKING

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Abstract. *Innovations in production and distribution of information cause revolutionary changes in modern society and emergence of a new techno-economic paradigm ("digital economy"). Information becomes the most important resource in digital economy, while information society's products take the form of digital flows through computer networks, unrestricted by national borders. Sustainable growth of digital economy needs a new form of money. Innovations in domain of payment systems put an end to money dematerialization process: money itself takes the form of digital flows through computer networks. Digital money will be suitable for micropayments and facilitate commodification of information. The new form of money will bring about fundamental changes in economic sphere as well as a radical transformation of banking industry. Contrary to electronic banking, which is complementary to traditional banking, digital banking is a qualitatively new form of banking that is going to be a substitute for traditional banking. Digital money and digital banking will form a framework for digital economy's growth.*

Key Words: *Innovation, ICTs, digital economy, digital money, digital banking.*

INTRODUCTION

Technology emerges in a social matrix. It influences and shapes the society. Full benefits from new technologies can be expected only after social institutions and structures are changed to adapt to the new technologies. An in-depth analysis of classical Industrial Revolution revealed that a series of technical innovations would not constitute a technological revolution: it must be interconnected with a series of fundamental social and cultural changes. Moreover, financial capital and information are important ingredients of a technological revolution. Technical innovations that led to classical Industrial Revolution would not be possible without support of financial capital, as well as without exchange of information (i.e. knowledge) [1, pp. 35–54]. While classical Industrial Revolution brought fundamental innovations in production and distribution of energy [2, p. 72], the new tech-

nological revolution brings fundamental innovations in production and distribution of *information* [3, p. 27]. Information becomes the most important resource in modern society.

1. THE RISE OF DIGITAL ECONOMY

Combination of strategic planning and fundamental scientific research funding in national "innovation centers" (e.g. *Silicon Valley* in the USA) resulted, among others, in formation of an international infrastructure of public computer networks. Developed countries invested heavily in the infrastructure, which has grown into a technical skeleton of emerging digital economy. Meanwhile, companies from private sector observed economic potential of the public computer networks infrastructure. Financial markets facilitated mobilization of necessary capital from an army of individual investors, and its channeling into the "high-tech" sector.

In order to exploit positive effects of networking, powerful multinational/transnational corporations began to re-organize their global business around networks. Operation on a global scale needed a lot of communication and raised telecommunication costs. In an attempt to lower the costs, powerful corporations urged governments all around the world for deregulation and transformation of telecommunications. As a result, public-sector policy in telecommunications is abandoned worldwide, paving the way for integration of networks on a transnational scale. Corporations have brutally usurped public telecommunication infrastructure, which has been built by billions of dollars of taxpayers' money. The aim was to develop a global telecommunication network, which would broaden effective reach of the market [4, pp. 5–10, 191]. As the technological foundation is being laid for multinational corporations' global business webs (b-webs), the network economy¹ emerges...

Deregulation and transformation of telecommunications has been paralleled with deregulation and liberalization in financial sector. Information-communication technologies (ICTs) facilitated globalization of financial markets. Global information-telecommunication network infrastructure enables global integration of financial flows into the "meta-network" — global financial capital network, which is being positioned at the very center of digital network economy [3, pp. 68–71].

Globalization in economic sphere makes a quantum leap with the Internet. In the emerging digital economy information becomes the most important resource, as well as an increasingly important product. As a resource, information is literally inexhaustible; but as a product, information must be charged for before it becomes widely available. As a result, a fundamental change in philosophy of production and distribution of information takes place. Information abundance on the Internet makes us, in a sense, dependent on information; this will facilitate gradual commercialization of public computer networks by transforming hitherto free information into commodity (so called "commodification of information"). Key information will soon be available only to those who are ready to pay for it.

Certain products and services, especially intangible goods and services, are suitable for distribution over computer networks. In physical world, such goods and services are

¹ The new techno-economic paradigm is often referred to as: "network society", "information society", "network economy", "digital economy", etc. by different authors. For distinction and use of the terms see: [3, 50–51].

delivered on a physical media (paper, CD, DVD, etc.). In digital world, intangible goods and services take the form of digital flows through computer networks.

When we analyze those "information society's products", it is not that easy to estimate the amount someone is ready to pay for them (for example: reading an article in an electronic newspaper or magazine, reading a chapter from an e-book, borrowing an e-book from an electronic library, downloading a music track, watching a video on demand, downloading a software update, etc.).

To address the problem, Okamoto and Ohta (1992) proposed a system of "superdistribution" [5, pp. 324–337]. According to this approach, information flows over computer networks can be charged for in a similar way as it is the case with water or electricity. Therefore, information society products should be charged based on the quantity of information flow. Since some activities on the Internet generate small quantity of information flow (e.g. checking e-mail, reading a text article), a payment system must exist which is cost-effective and capable of making very small payments — "micropayments"².

2. DEVELOPMENT OF A NEW FORM OF MONEY

The sustainable growth of digital economy, therefore, needs a new form of money. Transition to digital economy is going to be completed only when money itself becomes digital. Through a number of innovations in the domain of payment systems, a socio-technological infrastructure is formed for the new form of money. A historical transformation of paper money into digital money begins. Digital money has the potential to become a qualitatively new form of money, which will render current monetary regime, based on paper money, obsolete.

We can, in fact, look at the historical evolution of money as at the process of its progressive dematerialization. Throughout history, money took different forms, from commodity money to paper money. At the end of this dematerialization process, money takes the form of information flows through computer networks. Since increasing number of intangible goods and services also take the form of information flows through computer networks, instead of traditional exchange: *money-commodity* (or: *commodity-commodity*, in its original form), through computer networks we now exchange *information for – information*.

At the dusk of 20th century, through development of several generations of innovative payment systems and transaction mechanisms on the Internet, a gradual metamorphosis of electronic into digital money begins. A number of electronic/digital³ money systems have been developed: some of them are hardware- while others are software-based; some of them are online systems while others have offline possibility; some emerge as online extensions of traditional payment options, while others are based on an innovative and fully autonomous form of digital money. According to Guttman (2003), we can make distinction between three generations of digital money [6, pp. 110–143].

² Micropayments are small-value electronic payments (ranging from a few dollars to a few cents, and even less) especially designed for e-commerce of intangible goods and services over the Internet.

³ For conceptual distinction between electronic and digital money see: [3, pp. 121–126].

First generation of digital money encompasses systems based on electronic cheques, like *NetCheque* [for more details see: 7–10]; systems based on smart cards, like *Mondex* [see, for example: 11–12] and *VisaCash* [see: 13–14]; and systems based on digital coins, like *eCash* [see: 15], *CyberCash* and *CyberCoin* [see 16, pp. 162–164; 183–185] and *NetCash* [see 17–18]. Despite the fact that not a single system of first generation made a commercial success, the first generation demonstrated technological feasibility of online payment systems and gave birth to the new form of money.

As volume of electronic commerce on the Internet increases, the second generation of digital money emerges. Although second generation systems were fairly heterogeneous, there were few characteristics that made distinction between them and the previous generation of digital money. First, since credit cards were largely responsible for the failure of the first digital money generation, almost all systems of second generation were focused on the areas in which they felt they might have a competitive advantage over credit cards. Second, all systems of second generation were designed in such a way that their expansion does not depend on banks: the problem of negative network externality⁴ was solved by engagement of innovative marketing techniques. Systems of second digital money generation can be roughly divided into: systems based on digital money in electronic mail (e-mail money) and systems based on digital coupon money. Systems based on digital e-mail money made use of existing infrastructure of a very popular Internet service; thus, their initial costs were significantly lower. The systems had an interesting way to cope with negative network externality: usage of so-called "viral marketing"⁵ for recruitment of new users. The most successful system from the group, *Pay Pal*, allowed customers to keep money on their respective accounts for later use; thereby, an autonomous circuit of money flows is created that operates parallel with the banking system. *Pay Pal* began to reinvest unused balances accumulated on their clients' accounts — a process that, basically, enabled the system to act like a bank itself [for more details on *Pay Pal* see: 3, pp. 146–150]. Digital coupon money systems evolved in several forms. Some of them were based on coupon money in the form of online certificates, like *GiftCertificates.com* [see: 21], allowing their customers to buy the certificates from a number of firms on a single location. Others were based on coupon money aimed at certain lucrative demographics groups, like *Cybermoola* [see: 22], *RocketCash* [see: 23], *iCanBuy.com* [see: 24] and *DoughNET* [see: 25]; the systems were very popular, often targeting teenagers. The most ambitious systems of the second generation, *Flooz.com* and *Beenz.com*, tried to put an end to the domination of credit cards in B2C online payments. These were the first digital money systems to establish convertibility of their respective digital currencies. For a short period of time, these systems have attracted a respectable number of users. In the long run, they might have been capable of endangering credit-card duopoly, but in the short run they were not capable of surviving "Dot-Com Bubble Burst" 2000–

⁴ Term *externality* generally denotes influence of an action (positive or negative) on a third party that is not directly involved in the action. In economics, externality denotes a positive (e.g. a benefit or profit) or a negative (e.g. costs) effect on a third party that is not involved in the economic transaction. *Network externality* refers to a (positive or negative) network impact on parties that are outside the network. For more details on network externality see: [19].

⁵ *Viral marketing* refers to marketing techniques that use existing social networks to produce increases in brand awareness or to achieve other marketing objectives through self-replicating viral processes that are analogous to spread of viruses.

2001. Their almost simultaneous bankruptcy struck a serious blow to the second generation of digital money [for more details on the rise and fall of the two systems see: 26–27]. *Pay Pal* is the only system of the second generation to survive "Dot-Com Bubble Burst"; it was largely due to its steady position in P2P segment of e-commerce, which has no equivalent in traditional commerce.

Looking back at the third generation of digital money, we can see maturing in the life cycle of digital money. Some larger companies were attracted by earlier concepts and ideas and helped them advance into sophisticated online money transfer systems. Smart cards were finally supported by leading international credit-card companies. Important steps for their wider acceptance were taken with development of contactless smart cards, as well as with improvements in domain of digital wallet technology. A recent study reveals that banks consider smart cards to be the most important technology for the future of money [for more details see: 28]. Another system of first generation that has a future, is the one based on electronic cheques. Financial Services Technology Consortium (FSTC), strongly supported by the U.S. financial community, has developed an electronic cheques based system that is intended to become de facto standard in all segments of e-commerce. Both smart cards and electronic cheques are, in fact, online extensions of traditional payment mechanisms. More important, both systems are backed by banks, which are very interested to retain control over a significant portion of future digital money flows.

In essence, there are two main payment methods on the Internet: centrally accounted payments and digital money payments. Centrally accounted payments are made from bank current accounts (or credit-card accounts), while the payment is cleared through the clearing system⁶. Digital money payments can also be centrally accounted, but there is a number of digital money based systems that can operate without centralized accounting. The difference is crucial, since centrally accounted payments are more expensive. It is estimated that centrally accounted payments cost, on average, from 30 cents to 1 dollar per transaction, while decentralized P2P digital money payments cost, on average, from 1 to 5 cents [29, p. 9]. Therefore, decentralized digital money payments are the only logical choice for micropayments. Effective payment systems, based on decentralized digital money payments, will facilitate commodification of information.

3. TRANSFORMATION OF BANKING INDUSTRY

The new form of money will cause fundamental changes in economic sphere as well as a radical transformation of banking industry. Currently, there is only one barrier left that endangers the future of online banking: the absence of a universal and generally accepted form of digital money. Without an appropriate form of digital money that is created and circulating online, we cannot consider the Internet to be a fully functional medium for e-banking. "In the absence of cybercash, customers cannot withdraw cash while logged onto the Internet. For the same reason putting money into an account can be a hassle online. Except for paychecks and other direct-deposit arrangements, internet-bank customers have to mail their check deposits to the post-office box of their online bank. Not having their own ATMs thus proved a major competitive disadvantage for internet-only banks

⁶ For example, a credit-card payment over the Internet falls into this category.

whose customers had to pay fees whenever they used another bank's ATM or were forced to rely on the old-fashioned 'snail mail' for their deposits. This inconvenience was enough to dissuade many households from getting involved with online banking [...] Anytime you need to go off-line in order to withdraw cash or deposit checks, your banking activity gets disrupted. The banking experience on the Internet is simply not complete until we can do all of our banking online without interruption. Without access to a viable cybercash system for cash withdrawals or deposits, bank customers will simply refuse to consider the banks' web sites as equivalent to their brick-and-mortar branches. Electronic banking thus requires electronic money for its sustainability" [6, pp. 54–55].

In fact, the evolution of electronic money and electronic banking should not be studied separately; neither should their metamorphosis into digital money and digital banking be examined independently from their interaction with digital economy. Only with development of a universal and generally accepted form of digital money, we can expect realization of full potential of online, and electronic banking in general, as well as the beginning of an era of "digital banking". Digital banking will not merely represent the most advanced technological form of electronic banking that is completely based on digital money. Contrary to electronic banking, which is considered as delivery of some traditional⁷ and new banking products and services through electronic distribution channels, digital banking represents qualitatively new form of banking, in which all banking products and services are based on digital money and delivered through all distribution channels: electronic as well as traditional ones⁸. Thus defined, digital banking will not be the complement, but the substitute for traditional banking. Digital money will give rise to a radical transformation of banking industry, and economy as a whole: in addition to online transactions, digital money will also be used in "offline" transactions, instead of paper money⁹. Therefore, digital money and digital banking will form the framework for growth of digital economy [see: 3, pp. 278–279, 418].

⁷ As it was mentioned before, the withdrawal of cash as well as putting money into an account through electronic distribution channels is practically impossible without an appropriate form of digital money (with the exception of direct-deposit arrangements or remote deposit capture techniques).

⁸ Electronic distribution channels are, of course, logical choice for delivery of banking products and services based on digital money. However, customers' habits can not be changed overnight: some of them will continue to use traditional distribution channels. Therefore, during the process of transition towards digital banking, banks will not be able to suddenly disrupt delivery of their products and services over traditional distribution channels. It is not so hard to imagine a situation in which a "conservative" client visits a nearby bank branch to load his/her stored value card with digital money. In the long run, however, more efficient and convenient electronic distribution channels have the potential to completely replace traditional distribution channels.

⁹ Although banks are not very interested in digital money systems allowing for direct digital money transfers between two stored value cards, the fact is that the most of their clients become accustomed to such direct transactions in the era of paper money. When deciding which digital money system to use, the customers will probably choose the one that allows for direct digital money transfers. After all, there is hardly a good reason not to allow, for example, a person to transfer "digital pocket-money" directly to his/her child's stored value card, or to lend some digital money directly to his/her friend. Moreover, such card-to-card transactions would make it easier for individual entrepreneurs or small family businesses to receive payments for their products/services directly from their customers, without the need to apply for a registered merchant status, as it is currently the case in traditional credit-card based systems.

CONCLUSION

Worldwide deregulation and transformation of telecommunications paved the way for the emergence of international public computer networks infrastructure. The infrastructure represents a technical skeleton of digital economy. In digital economy, information becomes the most important resource. Information society's products take the form of digital information flows through computer networks, which necessitates fundamental changes in philosophy of production and distribution of information. The process of information commodification begins, which requires appropriate form of money. Digital economy needs a universal and generally accepted form of digital money, which is cost-effective for micropayments. The new form of money will bring about fundamental changes in economic sphere as well as a radical transformation of banking industry. Electronic banking, which is complementary to traditional banking, will be replaced with digital banking that is completely based on digital money. Digital banking is a qualitatively new form of banking, which will be the substitute for traditional banking. Digital money and digital banking will form a framework for digital economy's growth.

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DIGITALNA EKONOMIJA, DIGITALNI NOVAC I DIGITALNO BANKARSTVO

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Inovacije u proizvodnji i distribuciji informacija uzrokuju revolucionarne promene u savremenom društvu i nastanak nove tehno-ekonomske paradigme ("digitalna ekonomija"). U digitalnoj ekonomiji informacija postaje najznačajniji resurs, a proizvođači informatičkog društva poprimaju formu digitalnih tokova koji struje računarskim mrežama, nesputani nacionalnim granicama. Za održivi rast digitalne ekonomije potrebna je nova forma novca. Inovacijama u oblasti platnih sistema dovršava se proces dematerijalizacije novca: i sam novac poprima formu digitalnih tokova u računarskim mrežama. Digitalni novac biće pogodan za "mikroplaćanja" i omogućiće komodifikaciju informacija. Nova forma novca dovešće do krupnih promena u ekonomskoj sferi kao i do radikalne transformacije bankarskog sektora. Za razliku od elektronskog bankarstva, koje predstavlja aktivnost komplementarnu tradicionalnom bankarstvu, digitalno bankarstvo je kvalitativno nova forma bankarstva koja će predstavljati supstitut tradicionalnog bankarstva. Digitalni novac i digitalno bankarstvo postaće okosnica rasta digitalne ekonomije.

Ključne reči: *inovacije, informaciono-komunikacione tehnologije, digitalna ekonomija, digitalni novac, digitalno bankarstvo.*