Attila Horváth: Digital cash – a special payment system supporting electronic commerce

(Theses of the Ph.D. dissertation)

FIRST GROUP OF THESES:
Electronic commerce and electronic payments

T1 Thesis of the development of electronic commerce

B2C and P2P electronic solutions to commerce have already reached a phase of development that the applied payment system has become the most determinative and distinctive element of the individual systems.

E-commerce has arrived in a phase that the information and communication technologies (ICT) make it possible not only to select and order the goods from a distance but the payment and in case of some product types the delivery of those as well. Only the solutions answering all these requirements can be recognized as a true e-commerce system on the present level of development.

In this phase both the transmitting channels (broadband wired and mobile internet) and the forms of presentation (WEB-based technologies) make individual e-commercial solutions surprisingly similar.

The most important distinguishing factor of e-commerce solutions, electronic stores, auction houses, marketplaces, etc. is based upon the quality, costs, availability and other characteristics of the applied payment practices.

T2 Thesis of the inadequacy of macropayments

Not being primarily designed for electronic use the macropayment solutions applied widely at present are unsuitable for meeting the demands of electronic commerce sufficiently.

At present the main means of electronic payment in sector B2C is the credit card with a magnet stripe (90-95%), which was designed some 50 years ago and has been in operation in its almost original form ever since. Deriving from the constraints of this solution real on-line card-‘reading’ can not be carried implemented since information ‘reading’ requires special infrastructures & equipment. The electronic transfer of data visible on the card does not ensure satisfactory identification and it has considerable security risks.

Card acceptance is made possible for merchants to international card issuing companies that is why the solutions is completely unsuitable for auction and other types of P2P payments. A lot of different parties, complicated transactions and authorization procedures are involved in the process, more over allowances payable to banks and card issuing companies might amount to 5% of the transaction value, which make it inapplicable to small amount payments. Other traditional payment methods (e.g. account transfer) have similar disadvantages.

T3 Thesis of microtransactions

According to my analysis the answers to the present challenges can be given if payment systems which can carry out microtransactions economically and efficiently are to implemented.

Payments of small amounts mostly with a value of USD 1-10 are considered microtransactions. The feature mainly digital contents (sound, picture music), internet commerce, services (like road usage, parking, tickets for public transport), trade between individuals etc., which keep developing continuously.

With micropayment profits from low value transactions are expected to surpass the costs of transactions consequently low trade commissions, minimal risks and fast transaction speed are the main features required. If those requirements mentioned above are met, the sales of goods representing minor value can be carried out quickly and economically.

As far as their functions are concerned, micro payment systems are more developed since macrotransactions can also be carried out through them without any difficulty where as it is impossible the other way round.

SECOND GROUP OF THESES:

The digital cash

T4 Technological thesis of electronic money

In-depth studies have revealed that with regard to technological, security and efficiency dimensions, the systems based on electronic money are the most suitable to respond to the new challenges.

Science has already been occupied for years with the question of now the special, individual qualities of cash could be embodied in digital form supplementing it with other characteristics which derive from the demands for electronic use. To this end it has to fulfill a wide range of requirements: technological (atomicity, divisibility, scalability, etc.); data security (loss-tolerance, confidentiality, availability, attack-resistance, etc.) and data protection (anonymity, non-repudiation, authentication, etc.)

Besides all the above mentioned, digital cash ensures economic efficiency because it is capable of carrying out faster transactions requiring smaller capacity and data turnover at low fixed rate and low commissions.

T5 Thesis of materialization or the 'threshold of abstraction'

It has turned out from the in-depth study of different electronic payment systems that the most successful ones are those which can be related to some 'material' instruments, in the case of electronic money these could be accomplished by smartcards.

One of the main keys to the popularity of cash is that it is tangible it is present in its materialized form, thus being close to all strata of users. In examining the general use and popularity of cash substitutes it seems to be clear that through a card or a cheque – that is through some form of materialization – people are more likely to use frequent, everyday financial services than in the case of less tangible solutions based on accounts. I have found the 'threshold of abstraction'[*] concept created by Iván Székely adaptable to this phenomenon.

Smartcards supplied with standard chips which can be freely programmed are continuously keep replacing bank cards with magnet stripes (in Europe and Asia) offering an excellent platform to electronic money *(electronic wallet),* since they provide an opportunity for the holders to read them in the users' homes and increased security for the values stored.

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[*] Iván Székely: Changing attitudes in a changing society? Information privacy in Hungary 1989-2006, In: David Lyon - Elia Zureik (eds.): Globalization of Personal Data (forthcoming)

T6 Thesis of technological inadequacy

The electronic money systems in operation today only partly satisfy the qualities characterizing the ideal system which makes the most of the technological possibilities.

The dissertation examines whether the most popular electronic money systems – having been put into practice recently or not long ago – satisfy the requirements of the ideal system or in addition, the weaker-stronger technological bases have succeeded providing real opportunities for a business success.

It turns out from the analysis that none of the systems applied in practice today satisfies fully the ideal requirements. The main reason for this is that these systems have come into being as a result of scientific researches which were more or less independent of each other. However, these researches have proved to be successful in certain quality-groups at the very most. A uniform standard to unite all the researches and to satisfy every condition has not taken shape yet. This is one of the main reasons for the absence of penetrating success stories.

T7 Thesis of 'critical mass'

According to examinations a definite level of stable demand for electronic money has to be created for systems at both global and individual levels (a critical mass) in order to have it spread in large numbers in the market or so that its process will become self-supporting.

I have formed the following model by using the theory of external economies of information systems created by Hal R. Varian[**], professor of economics. When a paying system – which can be considered some kind of information network – is at the beginning of its life-cycle users are reluctant to use that as there are few other users to interact with. With the number of users growing the demand for the system in creases, since more and more people are using it so those absent are affected detrimentally.

When continuous in crease of demand exceeds supply a stable user stratum has already been formed and the development process becomes self-supporting. Finally, as a result of the economy of scale the individual willingness to pay decreases again but by that time the system has already caught on and the market has become big enough.

[**] Hal R. Varian: Mikroökonómia középfokon (p. 634-641), Akadémiai Kiadó, Budapest 2005.

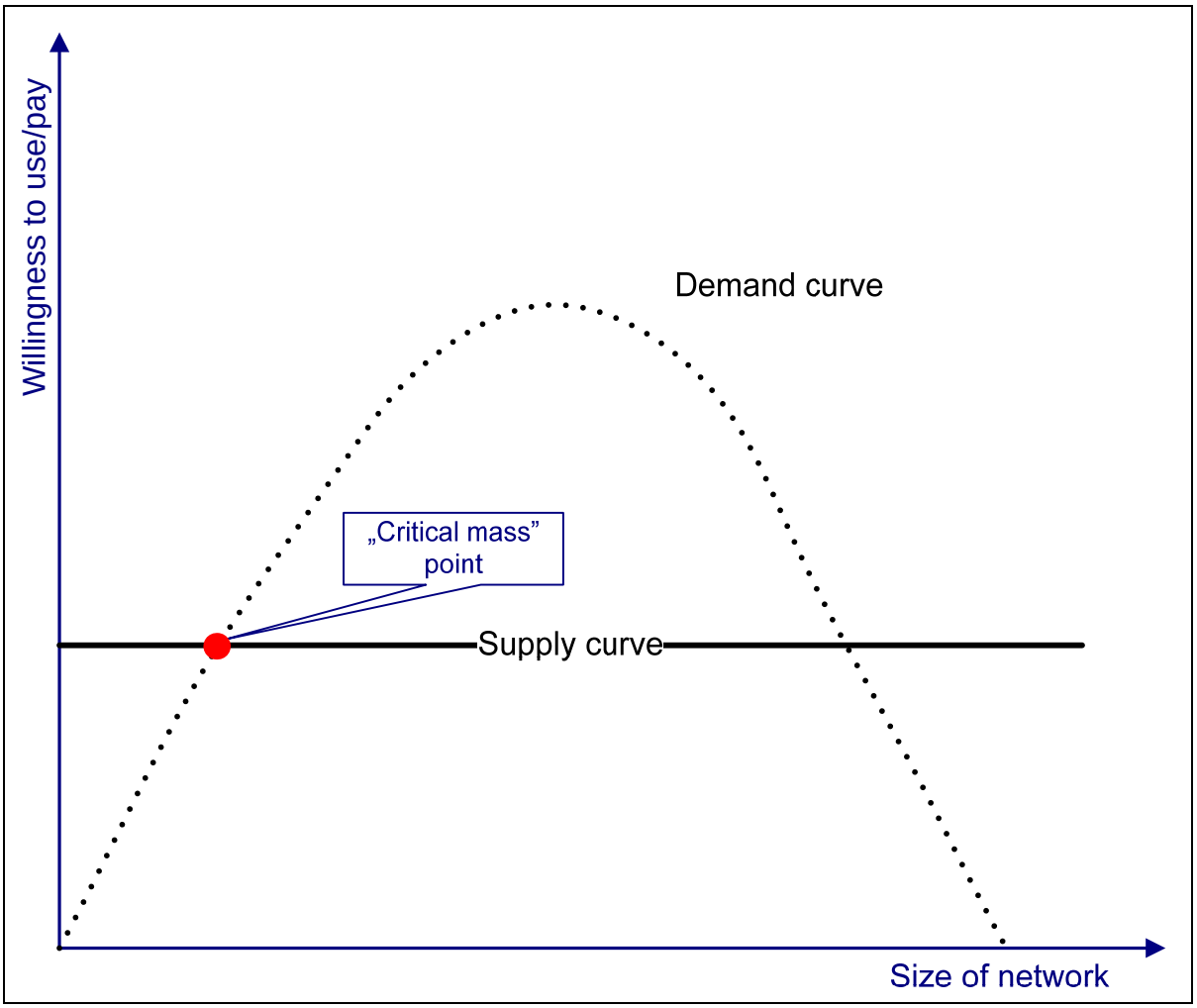

Figure 1: Balance of demand and supply and 'critical mass' in IT-networks based on (Varian 2005)

The theory of Varian as well as this model uses a very high level of abstraction and a totally static environment. Dissolving this barrier makes both ends of the model open, as life-cycle of systems, the user-mobility and technological development can taken into account as well.

T8 Thesis of business success

Based on the analyses it has been found that to have an electronic payment system introduced and operating successfully, a common presence of complex technological-market-legal conditions are indispensable. I have summarized the business criteria for success in a model with 5+1 factors.

In this interpretation business success means that a solution has reached such a level of technological, market economic and user support that it can break out from the layer- and insular-system stat and its general use – generally at an exponential rate – can start. There is a chance of reaching this goal if the conditions shown in the model below are fulfilled.

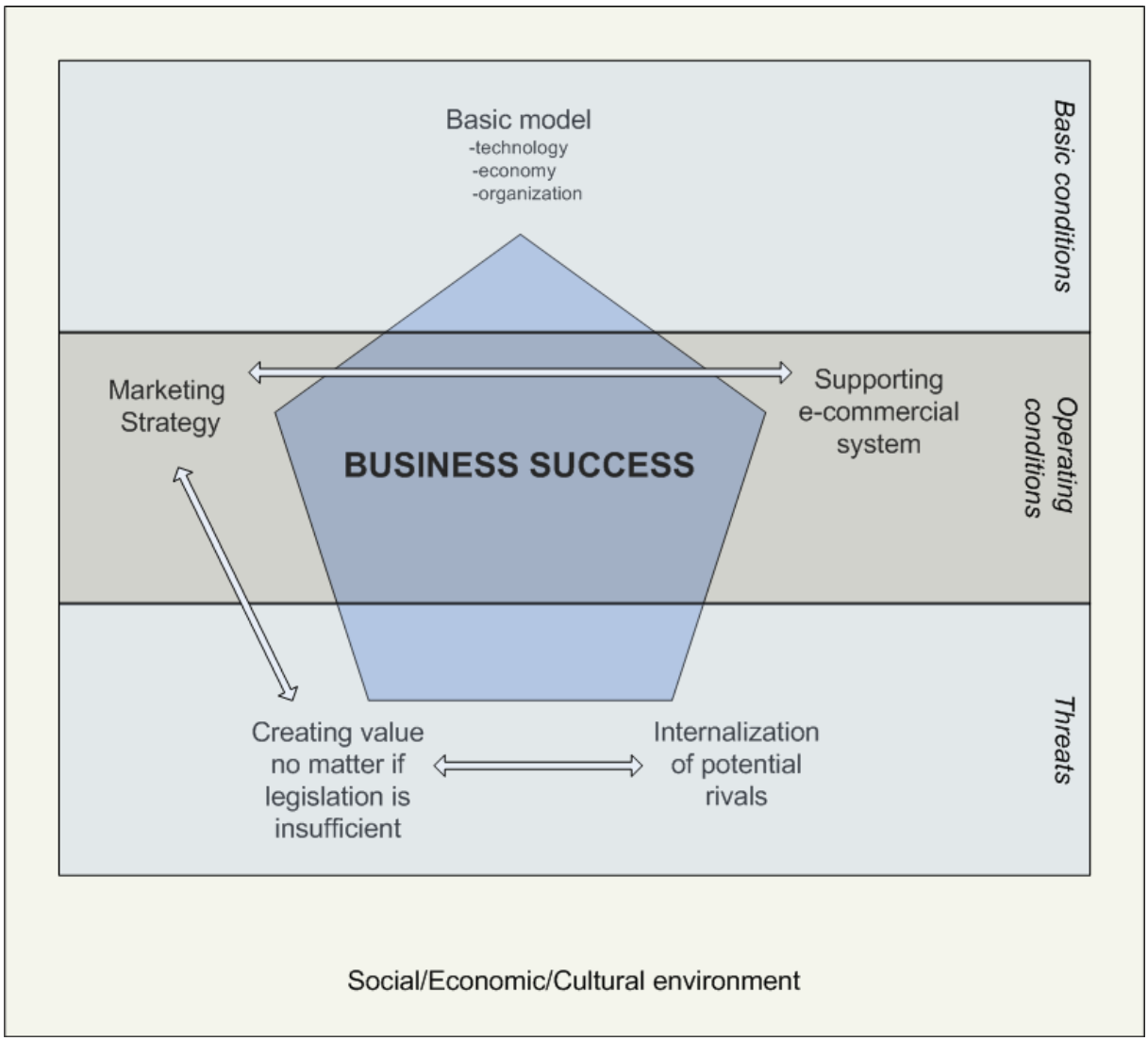

Figure 2: The 5+1 factors model of business success

Whereas the individual criteria are equally important, they form a three-tier structure: the maximal accomplishment of the basic conditions is inevitable in the model, however there can be trade-offs between the conditions accomplishing effective operation and the eluding potential threats. The major possible trade-offs are represented by the arrows. This model can be generally extended to the case of significant technological innovations and revolutionary solutions. The affection for e-commercial systems and the superior opposition are the specialties linking this model to the digital cash.

THIRD GROUP OF THESES:

Digital cash in Hungary

In Hungary there exist quasi digital cash systems mainly in the form of point-collecting and purchasing cards, operated by mayor commercial chains. Some of the international electronic money solutions are also accessible although neither the original Hungarian development nor the system-level support for real e-cash applications have gained ground.

T9 Thesis of the Hungarian general survey

The primary researches into Hungarian banking and electronic commerce have confirmed my supposition, that the application of alternative payment systems and the use of e-money in Hungary is rather lagging behind. The main grounds are the small, moderately developed, but very segregated market and the characteristics of the service providers.

The research carried out among Hungarian banks and electronic commercial companies has thrown light on the fact, that at present none of the financial institutions have concrete plans for issuing electronic money and they have no information about others intending to do so.

The banking sector keeps in evidence this new possibility and theoretically is ready to take the necessary steps, although the absence of big-volume and urging consumer demands get the market to wait.

In Hungary the banking and the mobile sector have the proper technological and business know-how to start an electronic payment solution. These service providers are parts of rival global interest groups, but they will not be able to singly reach an adequate market-coverage to the profitable operation, because of the market-size.

The members of the Association for Electronic Commerce (SZEK) are not prepared accepting payments by digital cash and they are not planning to move in this direction either. Their ideas about electronic payments are totally different, counting mainly on account-based mobile-solutions. They are awaiting an exterior solution, proper initiatives are totally absent.

The majority of potential Hungarian clients are conservative, moreover not properly educated; there are lots of digitally analphabets. The majority of the population is mistrustful toward every innovation concerning money because of the generally low income-levels. There are still hardware- and internet-penetration problems. Accordingly, several people take no interest in the new developments, no matter how useful those may be for the general public.

T10 Thesis of the Hungarian break-out point

Hungary can only follow the lead in respect of electronic finance if service providers are able to bridge over the natural differences and develop a common solution or some of the great global providers simply annex the market; however things may work out, it is essential that a new, more conscious and innovative generation of consumers appear.

There exist already stable infrastructures which have been built mainly to serve card-based payments. These having undergone some minor alteration might as well faster the introduction of digital cash systems. Loyalty-programs are very popular and widespread in which lots of people use merchant(group)-specific quasi-electronic money, thus the method is slowly becoming common knowledge. There are innovative Hungarian financial institutions which regularly anticipate client demands and provide the adventurous with access to financial solutions which are still received with suspicion by the majority. This is likely to happen to electronic money.

Inter-sectorial and insectorial conflicts are rather serious in Hungary, several e-payment projects have failed owing to the lack of cooperation between the players of the service sector (e.g. banks and mobile providers). The strictly isolated, rivaling global owner-structure makes any serious further cooperation doubtful.

A strong and independent newcomer service provider has more chance of being successful, although in reality only a big international network (e.g. card-company) or the parent company of a Hungarian player. The second option is dangerous though, because of the small market-size and the expectable incompatibility in case of more individual solutions.

A service provider of such volume is likely to be successful only if a global standard – which features one or two wide-range compatibilities and is internationally penetrable – is created and backed by a multinational group of service providers with considerable financial potentials.

To have it accepted by the general public there might be a need for generation-shift. If a highly innovative better-educated group appears in the financial markets they will be more willing to develop. But till then everybody can benefit from disseminating the financial and digital culture and training the users. It is only knowledge that can overcome disbeliefs and resistance.