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THE DEVELOPMENT OF CLEARING SERVICES – PARADIGM SHIFT

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According to the Payment System Report by the National Bank of Hungary, in 2018, there were already fifty systems providing instant payment service in already operating form or under development worldwide. The Hungarian instant payment system, which is to be available to the public as of 2 March 2020, belongs to the latter category. The present study summarises the path leading to the establishment of this system, the development of clearing infrastructure and the potential of instant transfer.

JEL codes: E42, N24, O30

Keywords: history of the development of clearing services, clearing services, clearing house, instant transfer/payment, risks of clearing services, digital challenges

1. THE IMPORTANT STAGES OF THE DEVELOPMENT OF FINANCIAL INFRASTRUCTURE

In the first part of our study, we provide a short overview of the process and stages of development of payment and clearing services leading to this level of development. Basically, the division that distinguishes two major periods is obvious: a historically significantly longer paper-based period and a several-decade-long period of electronic payment and clearing services.

1.1 The paper-based period

As far as the paper-based period is concerned, it is worth highlighting its start, the payment services based on depository service provided by the emerging banks of early capitalism, in particular transfers. The frameworks, activities and the chain of consecutive activities which have been present to the latest period of

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electronic payments and the appearance of instant payment systems evolved in the 18th century.

At the time, the banks operating in the "City" implemented payments by debiting their clients' deposits at their banks. In a simpler case, this activity took place in the house, when the deposits of both parties were managed by the bank. In a more difficult case, when the deposits of the beneficiary were managed by another bank, the given amount had to be transferred to the other bank. The latter process took place as follows: The payer instructed its bank to effect the payment. The courier of the payer's bank forwarded the instruction to the beneficiary's bank. Based on the instruction, the payer's account managed by the beneficiary's bank was debited, while the given amount was credited to the beneficiary bank's account. From time to time, the two banks offset their position. According to their aggregate gross positions, settlement took place either directly between them, or on their accounts managed by a third party, usually by the central bank.

Initially, this system worked in practice as follows: the couriers visited the beneficiaries' banks one after another, delivering the payment orders addressed to them. On a daily basis, the couriers covered a considerable distance even in a relatively small geographical area. This time-consuming long-distance delivery activity was rationalised due to an innovation: the couriers of the banks started meeting in a certain place, a suitable inn at the time agreed every day. Each of them handed over the instructions to the courier representing the given beneficiary's bank.

Later, at the first stage, interbank transfers were processed manually, in a centralised way. Each bank took its daily transfers to a central place (mainly to the central bank in Central Europe), where they were sorted according to the banks of the recipients. Transfers sent from "X" bank and to "Y" bank were classified into the same group in the case of each possible X-Y bank pairs. Following manual assortment and adding up the payable amounts, in other words, the clearing of the positions of the individual banks, interbank settlement took place in the central bank by debiting or crediting the central bank current accounts of the banks concerned. Subsequently, the banks managing the beneficiaries' accounts also credited the amounts to the accounts by manual processing. The whole transfer procedure took several days.

1.2 Payment infrastructures based on batch processing and net settlement

The operational use of information technology in the field of finances, in particular in payment and clearing services, was a big leap in the development of clearing services. In the case of payment (clearing and settlement) infrastructures, the above-mentioned transition began in the mid-1980s all over the world.

The use of computers in clearing services (clearing and settlement) started in the 1980s. The period to date can be divided into three phases. Already in the first phase, electronic clearing houses received, collected and sorted the transfers, then they sent the payment transactions to the banks and the information about the settlement amount to the central bank (*Kokkola*, 2010). Here, we should mention that the arrangement used in manual sorting can be tracked in the course of electronic settlements, in the so-called IBI matrix, as well.[2] Namely, the clearing houses collected the transfers from each clearing member on a given day, sorted them by recipient, then they sent the result to the clearing members. In the case of each clearing member, they submitted the difference of credit and debit to the central bank so that it could settle the current accounts. This process usually took one or two days.

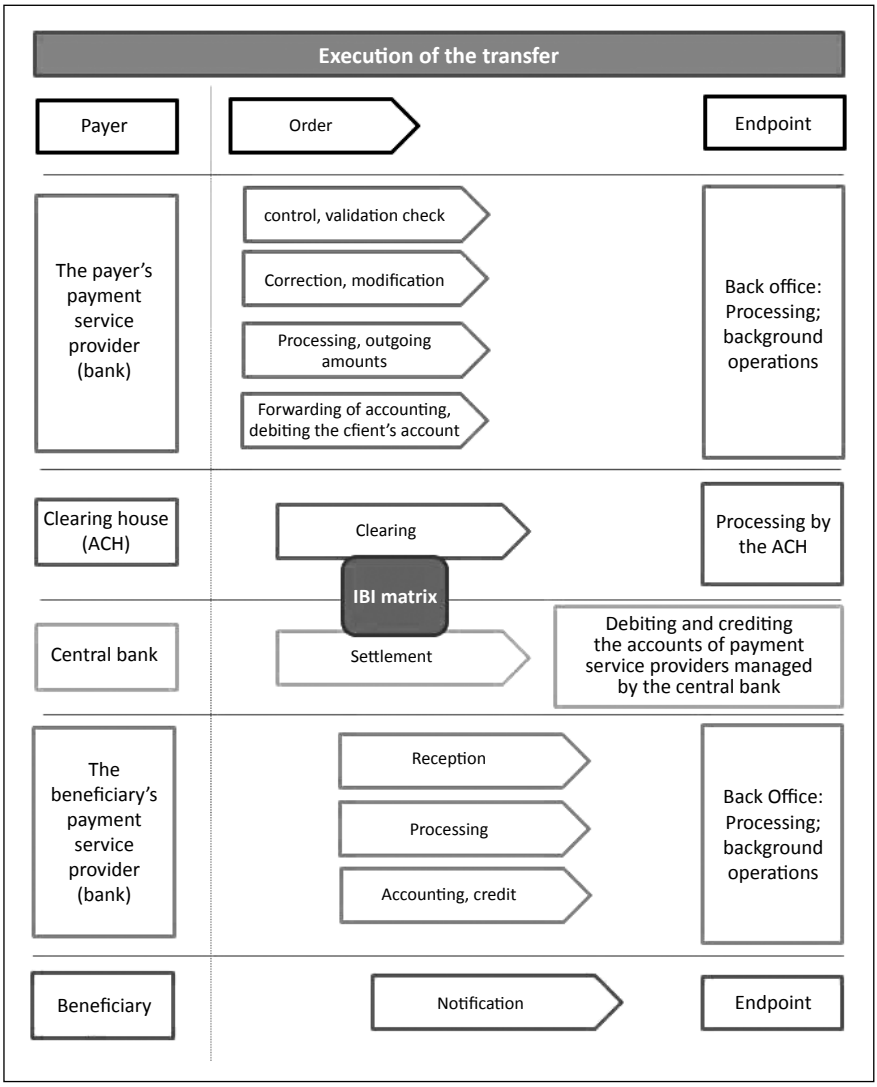
In the former socialist countries, the establishment of the two-tier banking system and, owing to the limited international commercial availability of the technology, this stage of development occurred a decade later. However, in these countries, the decade-long delay brought about faster and more modern IT systems and processes, as the IT level and the payment experience had already been incorporated at the time of the launch. In Hungary, transfers were processed on the IT platform of GIRO Zrt. BKR, then on the platform of InterGiro1 at night, therefore they were executed by the following morning (Blue Book, 2007. p. 204).

In the next phase, in the early 2000s, interday transfer systems were replaced by *intraday transfer systems*. From the point of view of clearing houses, development was mainly due to clearing and settlement cycles executed faster more frequently, however, the process steps remained unchanged. All this was enabled by faster data transmission channels, computers of higher capacity and longer IT availability. In Hungary, this period started with the service provided by InterGiro2 (IG2) in the summer of 2012. Initially, in IG2, clearing was conducted in five cycles a day, according to the so-called "four-hour rule". In accordance with this rule, the service providers involved in the payment chain had to ensure the credit of the amount of a given transfer order to the beneficiary's account within four hours at the latest during the day among the clients of direct members of the system. Later, as of 2016, the number of daily cycles was doubled, without changing the main rule. Since then, intraday clearing has been taking place in ten cycles a day.

The manual and electronic clearing processes described above, which are basically related to transfers, can be summarised in the following Figure:

2 IBI matrix: **I**nter**B**ank **I**ndebtedness Matrice: one of its elements shows the amount X bank owes to Y bank and, the other way round, the amount Y bank demands from X bank.

Figure 1
Clearing and settlement processes in the case of batch based financial infrastructures



Source: The authors illustration based on *Figure 6* in *Kovács–Divéki–Dávid–Pál–Kada* (2017), p. 28.

1.3 Paradigm shift – instant payment systems

In the European Union, the interbank system and the real time TARGET[3] payment system developed for very high EUR amounts, including national RTGS[4] systems, were established already a decade and a half ago. Partly due to the appearance of several instant payment systems operating in European national currency, the European Central Bank started examining the main factors and questions arising in connection with instant transfer systems and the possible European-level answers in 2014 in order to avoid the fragmentation of the single EUR payments market. The most important aspects included the protection of the consumers' interests, the promotion of competition among market participants and supporting innovative payment solutions. In the light of these aspects, the European Central Bank defined instant payment service as follows: instant payment is an electronic retail payment solution that is available 24 hours a day and credits the transferred amount to the beneficiary's account (nearly) instantly, irrespective of the payment method, the clearing and settlement infrastructure.

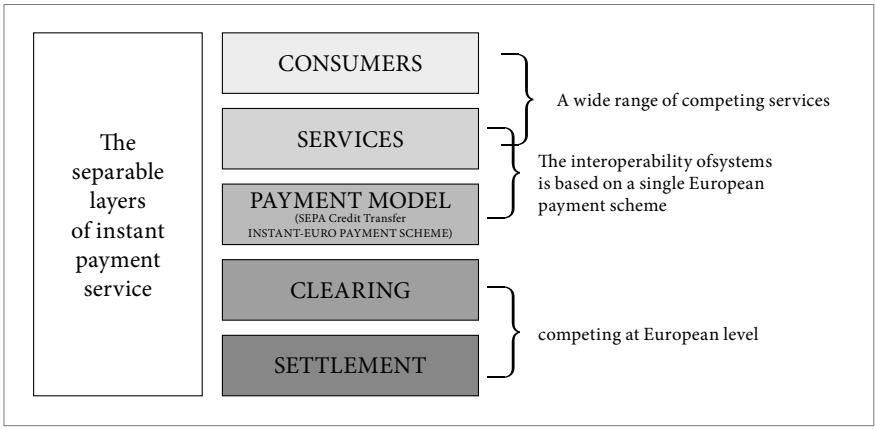
The European Central bank also stated that in order to promote competition and innovation, when developing instant payment services, an approach should be applied that separates the layers of settlement, clearing and payment services. In this way, everyone could built the services they developed themselves on a given clearing and settlement infrastructure, which would stimulate competition.

Based on the above, the ECB does not support the approach according to which one market participant operates all the services and the basic infrastructure their operation relies on through vertical integration. Regarding the strengthening of competition, the ECB laid down the requirement of interoperability (see: the SEPA End-Date Regulation), according to which the established systems and services shall be interoperable at pan-European level. One of the means of achieving this goal is the development of SCTInst, the new SEPA instant transfer scheme, which may facilitate the standardised operation of new payment infrastructures.

3 TARGET system: Trans-European Automated Real-time Gross settlement Express Transfer system.

4 RTGS system: Real-time Gross settlement system.

Figure 2
The European approach to the establishment of instant payment systems



Source: compiled by the authors

At this point, the clearing and settlement models which can be used in connection with instant payment systems should be mentioned. Basically, the clearing and settlement of instant payment transactions can be executed in three operational models. The individual models differ from each other regarding the fact whether the clearing and settlement of transactions take place continuously, in real time or in a deferred, cyclical way. In the latter case, the beneficiary's payment service provider receives only a notice of the transaction, while the amount to be paid is blocked on the payer's account. However, the transfer of the money between the banks occurs only later.

Table 1
The clearing and settlement models of instant payment systems

		Features of the model			
		Payment service	Messaging	Clearing	Settlement
Type of the model	Delayed clearing	instant	instant	cyclical	cyclical
	Instant clearing	instant	instant	instant	cyclical
	Instant settlement	instant	instant	instant	instant

Source: compiled by the authors

Bearing in mind the European standards described above, the National Bank of Hungary and GIRO Zrt. in compulsory cooperation with domestic payment service providers started a national project providing instant payment service.

The National Bank of Hungary published its detailed concept on the instant payment system (AFR) to professional audience in the spring of 2016. The Financial Stability Board (PST) took a decision on the rules of AFR in December 2016, then on the central infrastructure in the first quarter of 2017. The national project was launched in July. The members of its working groups were experts from member banks appointed by the National Bank of Hungary, in collaboration with the Hungarian Banking Association.[5] In order to ensure the flow of information between the project and its organisation, as well as the payment service providers concerned, at the latter institutions, contact persons in charge of the project were appointed, as well. In the autumn of the same year, GIRO Zrt. published the Rule Book. At the end of the year, following the opinion and consultation procedures with the banking community, the relevant MNB Decree was published, as well. At the start of 2018, the core system was selected, as well. From the spring of 2018, at the request of the member banks of the Hungarian Banking Association, complementing the workgroups of the national project, regular thematic session series were started in the Payments Working group of the Hungarian Banking Association. Firstly, they focused on topics discussed in the working committees of the AFR project, such as regulation, ancillary services and issues related to liquidity management, with the involvement of the National Bank of Hungary and GIRO Zrt.'s experts in charge of the project. Secondly, the experts dealt with the content of the request to pay as an optional service, the exploration of payment situations in which the use of the request to pay is justified and the development of the payment process. Thirdly, already in 2019, the theoretical, but mainly the practical questions of testing were in focus, also with the continuous involvement of the National Bank of Hungary and GIRO Zrt.'s experts.

In connection with the AFR, an aforementioned fact, which does not apply to the already existing or pending instant payment projects in other countries at all, should be highlighted: domestic payment service providers are obliged to take part in the project and join the central system. Consequently, the participants have to succeed jointly. In other words, the system and all of its members can start providing services only in perfect condition, keeping risks under maximum control and with 100% preparedness at the deadline set for the actual launch.

5 In the framework of the Banking Accession working group: the Business, Liquidity, IT Infrastructure, IT Security and Testing Sub-Working Groups, as well as the working groups responsible for Regulation, Ancillary Services and the Provision of Information

In order to achieve this goal, the Project Management Committee (PIB) had been following the preparedness of the individual participants as well as that of the central system for the actual launch set for 1 July 2019. At its meeting in May 2019, upon the proposal of the Project Management Committee and considering all possible risks, the Financial Stability Board decided that the deadline of the launch of the system for the general public should be postponed until 2 March 2020. Based on the decision, the actual launch of the central infrastructure shall be as of 1 July 2019 (according to the original deadline). As of this date, interbank transaction will be conducted between the payment services providers involved, however, only with limited amounts. Besides, client item shall not be recorded in the system by 2 March 2020.

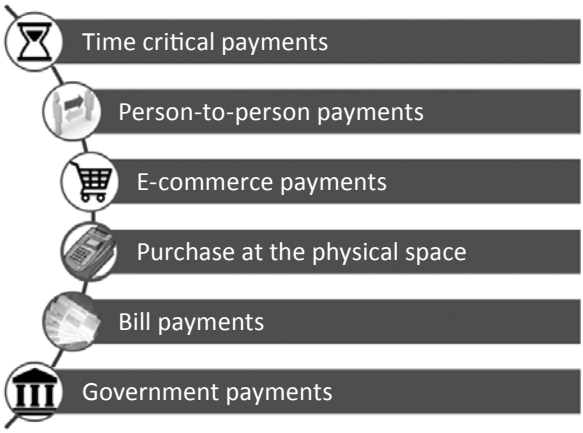
The PIB set a test schedule with enhanced requirements for the institutions concerned for the three quarters of a year until the actual full launch. According to the original plans, the first stage of this test period, the so-called pilot stage shall last from 3 June 2019 to 23 June 2019. Later, between 1 July 2019 and 31 August 2019, the actual voluntary test run shall take place, followed by the compulsory actual test run between 1 September 2019 and 1 March 2020. The instant payment service shall be available for clients only as of 2 March 2020.

Returning to the European standards described above, we will provide a brief review of the Hungarian instant payment system and the main elements of the service enabled by it. The infrastructure, a central system developed by a Danish company, was supplied by Nets A/S, which is based on the SCTInst[6] payment scheme developed by EPC at the request of ERPB, but it has more functions than the system that has been operating since November 2018.

The domestic regulation classified retail (low-value) transfers (up to the value limit of HUF 10 million) into the category of instant payments, prescribing a 5-second deadline for their execution. The new system works not only on business days, in business hours, but 24 hours daily all year round.

6 SCTInst: Instant SEPA Credit Transfer – SEPA instant transfer model

Figure 3
Payment situations and the instant payment service



Source: National Bank of Hungary (2016): Payment System Report presentation, Slide 28.

An above-mentioned feature of the domestic instant payment project is the basic service that payment service providers are obliged to join. In contrast with the SCTInst scheme, the instant payment system will be able to manage several secondary account identifiers from the start; the mobile phone number, e-mail address or tax identification number will be assignable to the payment accounts as alternatives.

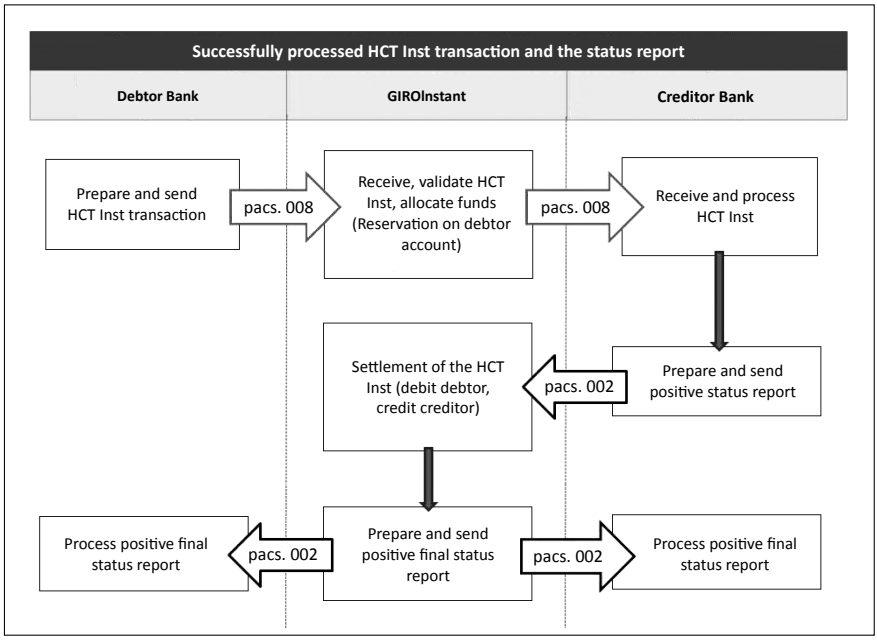
The system can also manage the requests to pay as an optional, non-compulsory service. The clients of payment service providers registered in the request to pay service shall be entitled, as beneficiaries, to submit a request to pay. During its period of validity of 2 months, the payers concerned shall pay the requested amount by instant transfer anytime. It should be mentioned that in the developed system, apart from classic payment account service payment service providers (ASPSP[7]), new service providers introduced by PSD2[8] will be able to participate, as well. In addition to the so-called payment initiation service providers (PISP[9]), service providers specialised in payments requests will be involved. The items correctly registered in the system by or through them shall be instantly and irrevocably executed and credited in the account of the beneficiary, who shall be entitled to dispose of them immediately.

7 ASPSP: Account Service Payment Service Provider

8 PSD2: Payment Services Directive 2

9 PISP: Payment Initiation Service Provider

Figure 4
The process of a successful instant transfer



Source: compiled by the authors on the basis of the HCT Inst scheme RB

It is expected by the ECB at pan-European level and the National Bank of Hungary at domestic level that the new regulatory requirements appear as practical requirements from the IT systems of banks, related to data transmission processes, concerning availability. As regards new challenges in risk management and frauds caused by immediacy, the service providers concerned shall give appropriate responses.

2. THE PERSPECTIVES AND CHALLENGE OF THE INSTANT TRANSFER FINANCIAL INFRASTRUCTURE

The instant payment service is the peak of the payment and clearing system we have known so far, as it enables final and irrevocable real-time payment between the payment accounts of the payer and the beneficiary involved in the payment transaction within a few seconds. The amount credited to the beneficiary's account becomes immediately available. This payment experience and new form of payment are also suitable for limiting the use of cash, therefore central banks (as institutions supervising payment) support the introduction of such systems.

(*Lentner,* 2013) The central banks also take part in the operation of the systems, because they, as institutions managing the clearing accounts, are responsible for settlement (transferring the given amount from the current account of one bank to the current account of the other bank).

Table 2
The comparison of the expected launch of instant transfers with interday and intraday clearing

Simple transfer	2004	2013	2019 expected	2019 expected (transactions below HUF 10 million)
Piece	103 452 093	157 793 365	208 580 812	207 529 753
HUF	47 568 316 499 976	66 679 950 935 805	112 074 824 296 196	42 101 552 517 322

Source: data published by GIRO Zrt. (July 2019)

2.1 At the gate of new financial services

In connection with instant transfer, two features should be emphasised: Firstly, the velocity of cash will be higher. Secondly, new innovative services may appear.

Based on our past experience, we know that the acceleration of payment led to changes in holdings on current accounts management, as the model of financial management has changed due to fastness and inexpensiveness. As a result, the savings on current accounts might be transferred to investments. The parameters of the instant payment system, along with low transfer fees, are very close to the terms of the "just-in-time" inventory management model (Kovács, 2010).

At social level, digitalisation never takes place in a homogeneous way. There are some social groups (typically the young and the better-educated) who are more open and start using innovations immediately. Of course, at the other extreme (usually the elderly and those who do not use information technology), people are willing to use only the classic service channels. In the light of the above, the digitalisation of the society is happening gradually owing to generational changes, education, organized and/or unorganized transfer of knowledge (*Csányi*, 2016). Consequently, the possible extent and intensity of digital transition is not determined by IT skills, but rather the receptiveness of the society.

The first natural consequence of digitalisation, which is also indicated by European and global processes, is the decline in the use of cash. The increase in the share of electronic payments has been a tendency for several decades. For exam-

ple, in the Scandinavian countries, this method of payment has already become predominant, therefore, of course, the use of paper money has been decreasing. The restriction of the use of cash on a daily basis is justified by the costs of the use and holding of cash for central banks and commercial banks, as well as by the opportunity cash creates for the black economy. Another effect of the use of cash is that it can be accumulated. This phenomenon can be successfully prevented by means of investment opportunities providing increase in value, phasing out the transaction duty collected by the banks from retail clients and the abolishment of free cash withdrawal.

By the 21st century, the mobile phone had become the most frequently used personal object. In the field of financial services, the mobile phone is still a passive device, which informs its user about bank balances and transactions. Active services due to which mobile phones can function as active devices, e.g. payment instruments, have appeared recently. The practical use of artificial intelligence and the databases opening owing the General Data Protection Regulation (GDPR) will enable the use of new digital services, including that of payment services on mobile phones, which will/may replace personal advisors and the manual processing of orders in an online bank. Therefore, in the following era, the mobile phone will be a device used for authorization, requesting only approval for using the financial service or product recommended by artificial intelligence. It will execute orders immediately in the systems of financial markets providing instant implementation.

2.2 The risks of immediacy

Chapter 7 of the book entitled "Retail Payments and their Clearing and Settlement Systems" includes a very detailed description of the risks posed by payment infrastructures (Kovács et al., 2017). Based on the structure of this chapter, we will review the changes in the risks.

- A legal risk usually arises if concerning any participant or any step of the clearing and settlement procedure, the law is not explicit, therefore it is unenforceable. In the case of instant clearing, the cancellation of the cleared order may pose legal and practical risks, as in accelerated transactions, the beneficiary could forward the received amount therefore the cancellation of the order became unenforceable.
- In this part, the financial risks will be reviewed by subpoints, as well.

Basically, the *credit risk between the clearing members* ceases if net clearing is applied in the instant clearing infrastructure. However, if the central bank pro-

vides technical loan on non-working days to ensure sufficient protection, credit risk arises between the central account managing institution and the clearing member.

Liquidity risk arises if any clearing member does not have enough liquidity available for executing client orders. In this event, the insolvent bank may cause delay or even a delay chain. Owing to the active communication network (e.g. twitter, YouTube) among clients, this situation might lead to bank attacks, as insufficient liquidity might cause panic outside working hours, when the clearing members concerned cannot arrange their positions owing to the closure of the money market without the technical assistance of the central bank.

Performance/settlement risk means that someone fails to meet their financial obligation, resulting in the evolvement of a non-performance chain. Fortunately, the risk of this is lower due to accelerated cash traffic and more accurately plannable liquidity, which allows operation with smaller cash funds (Kovács, 2010).

System risk refers to a situation when the operation of the whole financial infrastructure collapses due to the domino effect caused by the occurrence of credit, liquidity and performance risks. This situation may destroy confidence in the system, therefore the primary goal should not be to decrease risks, but rather to avoid their occurrence (Pintér, 2007).

Membership risk means that any member that is unable to continuously reduce the risks threatening them significantly increases the system risk. It is in the interest of the community that the terms of clearing membership should be strict enough to keep membership risk at low level.

Operational risks refer to the occurrence of a hardware or software error, communication disorder, a disaster or a security risk. In the event of a software or hardware error, instant systems are immediately stopped or switched to an alternative system. In the case of previous financial infrastructures, such errors, provided that they were corrigible within a few hours, did not tend to cause any significant client dissatisfaction. Regarding security elements, the increase in risk should be highlighted, according to which, in the case of instant systems, the chance of successful fraud is much higher (once an amount is transferred, it is practically impossible to trace).

Management risk should be mentioned because of paradigm shift, as the new financial infrastructure involves new processes, rules and infrastructure regarding which the management still does not have any experience. In the light of the above, of course, this risk is higher in the period following the launch of the new infrastructure.

The *country risk* may increase if fraudsters (especially in those countries/clearing houses which can finance only a weaker protection system) consider the intro-

duction of the new systems to be an opportunity, therefore the number of fraud attempts becomes invasive following the launch of the system.

3. SUMMARY

The development of financial infrastructures is determined by stages. The first one was a paper-based period, during which orders were manually collected, selected and execute in a central place. Practical information technology enabled the establishment of automatic clearing houses which have ensured the management of great volumes of paper-based processes since the 1980s; such clearing houses collected transactions in batches, sorted, posted them and had the balance cleared with the central account-managing bank on a net basis. Initially, this process required one or two days, then one or two hours. Nowadays, the actual challenge is instant mass clearing. Instead of processing the transaction, the clearing house only forwards it to the central bank in order to have the total amount cleared. All this takes only a few seconds.

Instant transfer brings about new processes, poses new or changed risks, the exploration of which is the basis of risk reduction. The study presented these risks classified by topic.

Instant transfer also enables the introduction of new products and services. The system will spread in proportion of the society's digital receptiveness by means of the mobile phone as a technical device.

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