

**Competitive Paper for IMP 2012 Conference**  
**Analyzing the Nature of an Institutional-Business network – Case Study Example**  
**from the Hungarian Cash Supply**

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**Abstract**

This paper focuses on analyzing a special network, in which an institutional member acts as a key influencing node/party. By analyzing the case study example of the Hungarian cash supply the paper introduces the different kinds of special network patterns that can appear in cases, when the network exists in an institutional (B2A) context and the institutional network member has a special regulatory role in influencing the manner of other business network members. The research findings are based on the application of the case study method.

From managerial point, the research results can highlight two important messages about the manner of the analyzed special institutional-business network. First, they can show how the three basic paradoxes (opportunities, influence and control) of a business network can appear in institutional (B2A) context. Second, the analyzed case provides evidences that influencing and interplaying network effects are valid for an institutional member as well, even if it has “special rights” to influence the basic network processes and structure.

**Key words:** network, network paradox, institutional network member, cash supply

**Introduction and literature review**

As it was mentioned in the abstract above, the aim of this paper is to analyze a special network in which a key node exists as an institutional one. By introducing the major actors and processes of the network, the appearance of three basic network paradoxes (opportunities, influence and control) in this context will be also analyzed. The first chapter summarizes a short literature review about IMP’s network approach, the second one introduces the actors, resources and activities in the selected network and the third one provides the evaluation of network paradoxes.

**Short summary of the applied network approach**

Business networks can be interpreted as the group of two or more interrelated business relationships, where each business exchange occurs between the enterprises construed as collective actors (Emerson 1981, quoted by: Anderson et al. 1994). In this case, the degree of relatedness shows the extent to which “exchange in one relationship depends on an exchange, or lack thereof, in another relationship” (Cook and Emerson, 1978:725). In addition, two connected relationships are directly or indirectly linked to other relationships, which also affect their operation and constitute a broader business network (Anderson et al. 1994).

Development and operation processes of business relationships can be analyzed and interpreted through the actors, resources and activities they involve (Håkansson and Johansson 1992; Anderson et al 1994; Håkansson and Snehota 1995). These three key layers express the

interconnectedness of interfirm relations and network connections. The actors layer represents the interpersonal relations between the counterparties, encompassing attitudes, emotions and norms that determine the level of trust, commitment, recognition and influence between the parties. The activity layer expresses the existence of the integration or joint coordination of processes within the relationship. The material flows between participants in the relationship and the accompanying information flows (such as demand management, distribution, customer service, document management) may be integrated on different levels, thus the degree of “interrelatedness” generated by the activities may also be different. The mutual adaptation of the resources possessed by the parties is the third important layer in the relationship between the parties. Some resources of the parties to the relationship are continuously confronted with and/or adapted to each other, resulting in the creation of pooled resources in the relationships, which deepen the interrelatedness.

The aforementioned three layers are not independent but closely related: activities may support or hinder the mutual adaptation of resources; resources may limit or promote integration between activities and actors may discover or postpone opportunities for the adaptation of resources and deepening the integration of activities. Not only do the layers between actors, activities and resources link elements of the specific relationship in which they exist but they also help establish bridges connecting the relationship with additional relationships, thus the three aforementioned elements can be considered as building blocks of the network surrounding the relationship concerned. Consequently, Mandják (2005) considers the business relationship and network to be the peculiar lattice of the three layers listed above.

The interconnectedness of actors, activities and resources layers always creates positive and negative effects within the network, which are not avoidable by the actors. This network influence generates three main paradoxes related to the opportunities, limitations and control of the members (Hakansson- Ford, 2002). The *first paradox* expresses that companies can not follow their own aims independently; their activities and opportunities are always limited by another member’s activity and behavior. This mutual interaction among network members can be considered as an opportunity and a constraint at a time. Belonging to the network means learning opportunity and reduced vulnerability, but also a dependency on the network structure and limited room for changes. The *second paradox* can be interpreted as “network is both a way to influence and to be influenced” (Hakansson-Ford, 2002 p.136.). Companies in a network naturally want to influence the other actors in order to enforce their aims and expectations, but on the other side all network members are influenced by the others, so no one can act on a totally opportunistic way. The *third paradox* belongs to the control activity done by the actors. The companies want to control their surrounding environment – including the network partners, activities and resources. But the more a company increases the level of control, the less smooth and innovative will be the processes of the network. A strong, long term control by one party can result the reduction of common knowledge and innovation potential, and in an extreme case the network structure can turn into a “quasi-hierarchy”.

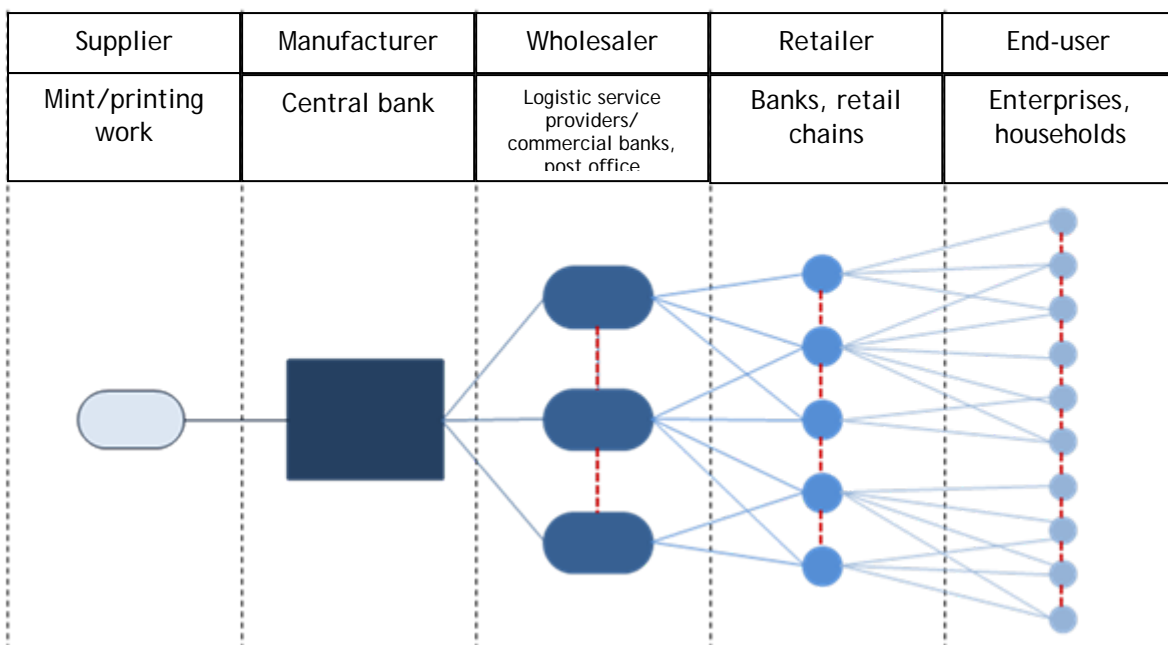
## Structure of the Hungarian cash network

In this chapter the actors of the Hungarian cash supply network, the activities among them and the required resources will be analyzed. After that explanation I assess the growth of the network, that is, changes in the various actors, activities and resources in recent years and their impacts on the whole of the network.

### Actors, activities and resources of the cash network

The structure and participants of the Hungarian cash network is first described in the overall Figure 1. Banknotes and coins perform their role in the economy in the following, highly simplified circulation. Pursuant to its legislative monopoly, cash is provided to economic actors by the central bank, which is responsible for the production function as well - in Hungary, through its own subsidiaries<sup>1</sup>. From the central bank, the cash makes its way via credit institutions and the Post Office to economic actors, account holding enterprises and households<sup>2</sup>. In this process of intermediation cash logistics service providers play an essential role, as in Hungary banks and the Post Office have almost totally outsourced the operational tasks of their cash functions to such providers. After households and enterprises have spent the cash held by them through consumption relating mostly to the retail and service sectors, the cash returns to the banking sector and the Post Office, which, depending on the prevailing demand, recycled part of it to their retail and wholesale clients while the “remainder” and the rejects of inadequate quality are returned to the central bank. Then the central bank reprocesses the cash received, checks for genuineness and fitness, destroys poor quality, unfit notes and coins and provides for their replacement by new ones.

**Figure 1.** The Hungarian cash network



<sup>1</sup>In Hungary banknotes are produced by the Pénzjegynyomda Zrt., coins by the Magyar Pénzverő Zrt.

<sup>2</sup> In case of households, there are significant payments, mostly social transfer related, where there is no account keeping relationship between the households and the institution (Post Office) implementing the payment.

## Central bank – the key node

In the Hungarian cash supply network the central bank, called Magyar Nemzeti Bank, (hereinafter MNB) can be identified as focal company node (Cox et al. 2001). Through its subsidiaries it provides for the production of new banknotes and coins in the necessary quantities each year, which are issued in different volumes by denomination in the course of payment transactions, depending on the outcome of banknote verification and on the cash demand of economic actors; in addition, through its regulatory decisions it determines the denomination structure of the cash stock in circulation, assures the security of supply and protection against counterfeiting, and determines the terms of recirculation to be observed by market actors.

The final stop of cash is also the central bank: the destruction of substandard quality banknotes is the exclusive right of the central bank<sup>3</sup>, and so is the decision on the withdrawal of outdated denominations. The role of central bank regulation, as provided in the MNB Act in Hungary, extends to influencing the cash transactions of both the professional cash-handling sector (cash logistics service providers, credit institutions, retail units) and households.

I consider, however, that the role of the central bank in the cash network goes beyond the significance of a traditional focal node, for the following reasons:

- with its decisions on the structure of denominations, the central bank can actively influence the supply of products, which in turn feeds back to demand-side requirements (e.g., withdrawal of 1- and 2-forint coins, denomination exchange of the 200-Forint banknote-coin) and thus has an effect<sup>4</sup> on the demand of other network actors;
- through its extensive power in ensuring cash supply, the central bank directly and actively influences the activities and operations of the other members of the network. Depending on the strategic decision of the central bank concerning itself and its interpretation of its role (see boxed article), the activities and possibilities of other network (market) actors participating in the cash cycle also change.

In respect of their own roles, four most typical cash network operational models can be identified in the international cash network operation: service providing, outsourcing, involving and delegating (Schmidt, 2004). The following points provide a short introduction about them.

1. In the **service providing model** the central role of the central bank is to control all the sub-processes of the cash cycle, and market actors are not involved in the recirculation process. The service providing central bank performs a significant part of cash logistical activities through its expansive branch network. The model has the advantage that due to the direct return of bank notes the central bank may directly oversee the quality of banknotes and filter out counterfeits. Disadvantages include the high cost of cash processing in the central bank and the increased length of the path of cash. The high cost of cash processing in the central bank is an additional burden on the national economy if the fees charged by the central bank are too low and they fail to cover the costs incurred. The service providing cash logistical model is exemplified by the Belgian, Czech, French, Greek and German economies.
2. **Outsourced service model**: in some instances, the central bank (Austria, Bulgaria, Denmark) outsources its own cash processing to its (wholly or partly owned) subsidiary. Typically this central bank affiliated company is the exclusive provider of banknote recirculation services;

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<sup>3</sup> This is mostly for practical reasons of cost rather than considerations of principle. In several countries (e.g., Norway, New Zealand) market actors are entrusted with the destruction of worn banknotes.

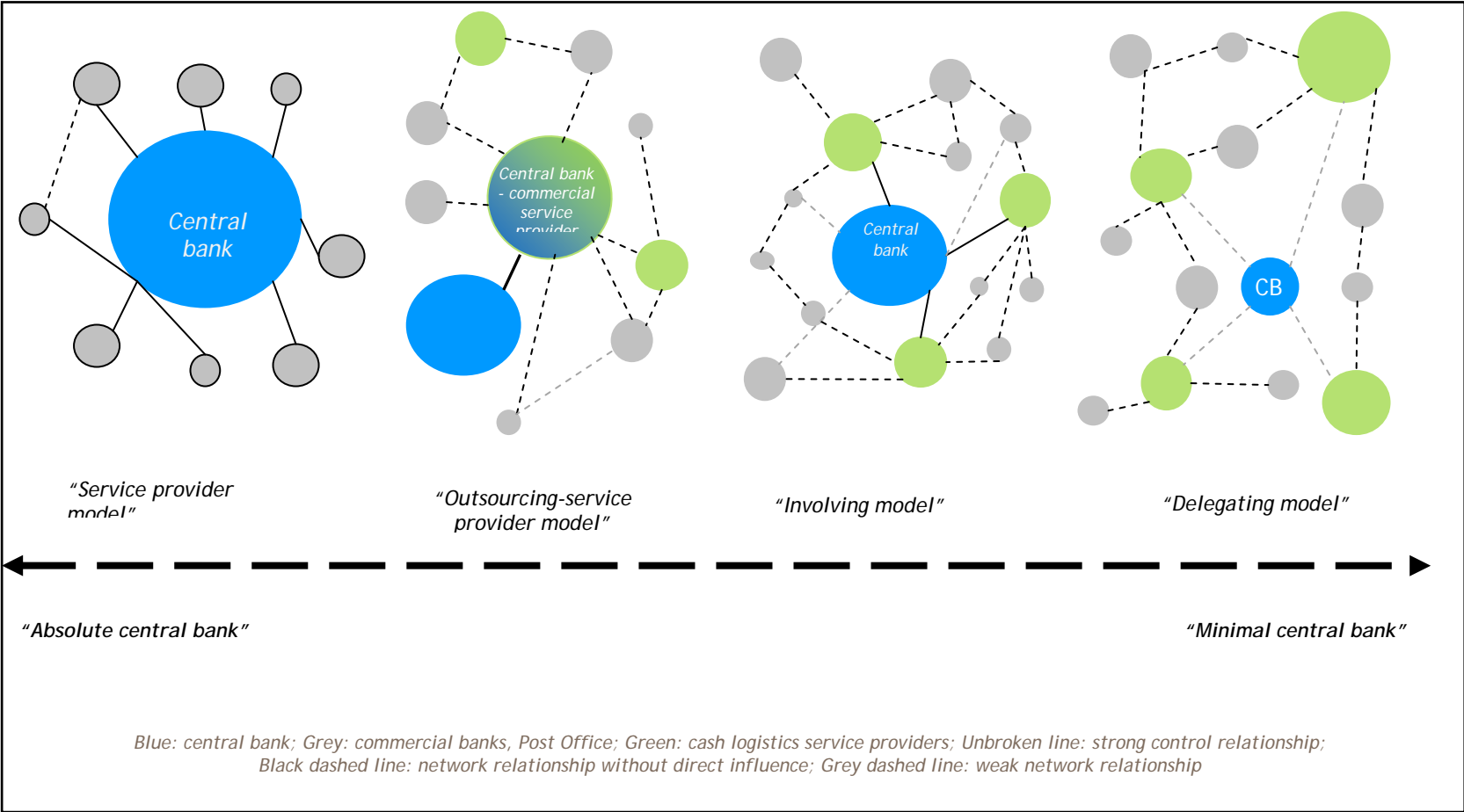
<sup>4</sup> By effect we mean that the appearance of new banknotes or coins, or the withdrawal of existing ones, has a fundamental effect on cash use and the role of the individual denominations. For instance, after the introduction of the 200-Forint coin in 2009, demand for 100-Forint coins dropped.

cash logistics service providers tend to perform only network distribution functions. These central bank processing companies tend to have commercial banks as co-owners. The central bank had hoped that through privatisation, a partly privately owned company would operate more efficiently than a wholly state-owned firm would. Even though there are examples of enterprises successful in the operational sense (Austrian firm retained in state ownership, fully privatised Norwegian company), this model was a failure in Sweden, for instance.

3. In the **involving model**, the central bank limits itself to satisfying the cash demand of the economy while the day-to-day functions of cash recirculation are left to market actors (mainly commercial banks and/or cash logistics service providers). Thus the central bank focuses only on the destruction of unfit banknotes and coins, the receipt of the cash in excess of the daily cash needs of the economy and safeguarding the quality of banknotes and coins in circulation. The advantage of the model is to shorten the path of cash and reduce the number of actors in the cash cycle because cash processing outside the central bank happens mostly at logistic service providers. The disadvantage is that as banknotes return to the central bank less frequently, the quality of banknotes in circulation may deteriorate. Involving central bank models exist in the US, Spain and Portugal.
4. In the **delegating model**, the central bank lets market actors perform cash recirculation; indeed, going beyond this, it reduces its cash circulation related activities to the minimum, focusing only on the production of cash, banknote issuance and, generally, destruction as well as monitoring market actors. In this model, central banks do not maintain an extensive branch network as day-to-day cash processing has moved to commercial banks or logistic service providers, which operate on a commercial basis. The central bank's logistical inventory serving to satisfy the daily cash demand is stored separately in privately owned cash centers. Delegated central bank models exist in the UK, Norway, Ireland.

According to the “operating strategy” or role perception of the central banks, they practically independently determine the structure of the cash network of their respective countries, thus they may be called network builders. This strong network influence is less typical in corporate life, the focal companies generally have influence of varying degree on the operation of the surrounding network but they can rarely shape it so directly and intensively. In Figure 2 overviews the scheme of possible structures of cash networks influenced by the central bank operational models.

**Figure 2.** Structural models of cash networks based on the role of the central bank



Source: figure compiled by author

Before the political transition, the MNB also ruled the cash sector practically as a total central bank, then from the 1990's onwards, simultaneously with the development of the banking system, it gradually redefined its role. First it replaced the service provider model by the involving model<sup>5</sup>, then in the second half of the 2000s it took firm steps towards further "retreat". According to its current cash strategy adopted in 2008, the MNB proceeds in its internal and external regulatory and (process) development decisions to promote the more efficient operation of the entire cash sector, and at the same time to manage the public funds used for its own operation as cost efficiently as possible. It is important to realize that decisions on the role of the central bank in the network also determine the functions the central bank is going to perform for market actors using public funds. In its own view, the MNB considers it necessary to perform only those cash functions where its role is justified either because of the state monopoly on issuance or for reasons of efficiency or quasi market failure as market actors would certainly be unable to provide a solution optimal for welfare. Thus the MNB has delegated the bulk of tasks of banknote and coin recirculation to market actors (commercial banks, the Post Office or the logistical service providers appointed by them) and it takes no part in daily cash distribution either. However, it has kept the destruction of banknotes, quality control and coordination and implementation functions relating to the security of supply, and it is likely to do so in the long term as well. The tools<sup>6</sup> used by the MNB to actively influence the operation of the Hungarian cash network are reviewed briefly in the "boxed article" below.

Of the cash regulation tools of MNB, two plus one tools of administrative in nature and one quasi-commercial arrangement are worth mentioning, which can be used to influence the operating processes of the cash sector in the short and long term alike.

- **Decree of the Governor of the MNB on the processing and distribution of banknotes and coins and on protection against counterfeiting**

The framework for the recirculation of banknotes and coins outside the central bank is regulated by decrees of the Governor of the MNB, at present by MNB decrees no. 11/2011 (IX.6.) and 12/2011 (IX.6.) The scope of the decrees covers Hungarian credit institutions, the Post Office and cash logistics service providers and it imposes strict quality standards, particularly in the case of banknotes, concerning the hardware and software versions of banknote processing machines and output quality parameters required for the recirculation of banknotes. In order to safeguard the quality of banknotes and provide protection against counterfeiting, the two most stringent requirements demand that cash logistics providers are obliged to process at least 90% of the banknotes taken for processing by machines approved by the MNB, and that after 1 January 2012 only machine-processed banknotes may be used to replenish automated teller machines. The central bank regularly checks the providers for compliance with these requirements and if any irregularities are found, sanctions may be imposed. These decrees also set the basic standards for the cash-related behavior of credit institutions and the Post Office vis-à-vis households through the regulation of the terms of denomination exchange and rules for the treatment of suspect media of payment.

<sup>5</sup> This decision was made for practical reasons rather than as a result of strategic considerations because the MNB was unable to adapt to the increasing cash volumes with the facilities and devices it had at the time; therefore, it increasingly allowed market actors to participate in cash processes.

<sup>6</sup> In addition to the arrangements described, a number of other regulatory solutions exist around the world, which the MNB does not use due to theoretical or market reasons: for instance, it does not interfere in the settlements and charges between service providers and banks (B2B) or the retail rates applied by the Post Office and commercial banks (B2C), it does not regulate conditions for the installation of ATMs, it issues no "due diligence" requirements in B2B (e.g. security of persons, property and information security), it does not regulate the market and terms of cash transportation, etc.

- **Terms and conditions of business for clients holding accounts at the MNB and for cash logistics service providers**

The MNB determines in its business terms and conditions the services and terms it offers to credit institutions having an account at the MNB, the Post Office and their cash logistics service providers. These terms regulate the procedure of lodgement and withdrawal of banknotes and coins and the administrative and technical requirements concerning the execution of transactions, which have a fundamental effect on the market behaviour of these network actors as well. For instance, in case of banknotes the MNB provides no service below 1 bundle (1000 pieces) and for lodgement it accepts only banknotes already processed by the market actors, with the fit and unfit (reject) notes separated. In case of coins, the MNB does not serve market actors as long as they are able to satisfy their needs through transactions between one another.

- **Fee policy**

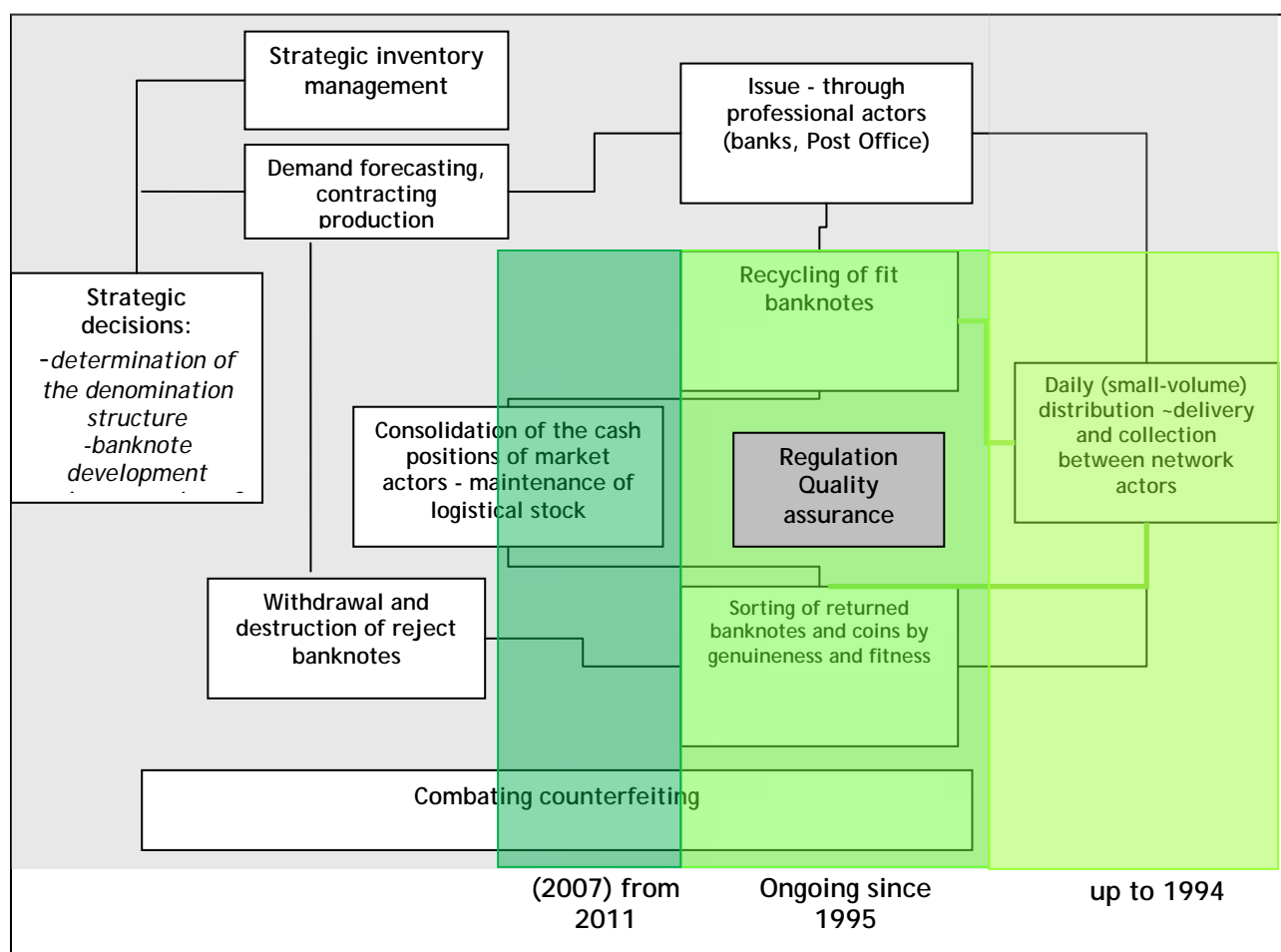
The so-called commercial-type regulatory tool to regulate the relationship between the MNB and credit institutions and the Post Office is the fee policy. This means that the central bank performs the services specified in the business terms and conditions for market actors for a fee - with the exception of the acceptance of reject and suspect banknotes - and changing these fees can affect the type and number of transactions it engages in. In the case of the MNB, the use of fees is clearly not for purposes of making a profit; instead, they are used by the central bank as a market regulator motivation tool to influence the behaviour of the actors in direct relationship with it.

## **Activities and resources of the MNB**

That was already noted that according to the strategy and cash-related operating philosophy it chose to adopt, since the transition the MNB has increasingly moved towards regulatory and quality assurance activities, retreating from the day-to-day operational tasks of cash supply. To explain the particular activities performed by the central bank in Hungary and the changes in the responsibility-sharing between market actors and the MNB in recent years, we illustrate the changes in the cash-related activity structure in Figure 3.



**Figure 3.** Changes in the cash-related activities of the central bank



**Source:** own illustration

In the figure the grey shaded area indicates activities reserved for the central bank while different shades of green show the changes in the division of labour between the central bank and market actors. Until the first years after the transition (approx. until 1994) the central bank ruled the entire cash-related field and the role of the few commercial banks present in the country and of the Post Office was restricted to cash distribution in their own branch networks. As the two-tier banking system consolidated and the range of commercial banking services expanded, the demand of actors in the network for cash services of higher standards increased and, although in a primitive form, cash logistics service providers appeared in the market, initially participating only in cash transportation. The central bank's banknote processing capacities proved increasingly insufficient to serve the growing needs of banks and the Post Office; consequently, the central bank, in several steps, allowed market actors to reissue in their own networks the cash they held following manual or automated processing. This meant that market actors were allowed to process the cash "accumulating" in their networks independently and to recycle it on an as needed basis and they had to turn to the MNB only if they needed additional cash to serve their clients or if they wanted to lodge their "surplus" cash. This step as well as increasing automation on the client service (ATMs) and banknote processing (high-capacity processing machines) sides encouraged banks and the

Post Office to take on complex<sup>7</sup> cash management activities. In Hungary most banks and the Post Office chose to outsource day-to-day operative cash-related functions to professional cash logistics service providers, keeping only management decisions in house. This trend resulted in the expansion of the activities of cash logistics service providers and in the concentration and strengthening of service providers mainly with a view to improving quality. Simultaneously, and as a result of these steps, the day-to-day operative cash logistics role of the central bank was gradually de-emphasized<sup>8</sup>, practically restricted to the consolidation of stock between market actors, and emphasis shifted more and more to the previously less important function of regulation, quality assurance and the related supervision. These changes occurred gradually in the approximately ten years after the second half of the 1990s. The next important milestone in the shrinking of central bank operations was when the central bank allowed market actors to maintain central bank stocks of coins in 2007 and notes in 2011 for stock-consolidation purposes. In practice this means that as the cash positions of the various banks and the Post Office<sup>9</sup> is different due to the composition of their client base (some actors tend to have cash surpluses while others are so-called dispensing banks and need cash all the time), generally it is the MNB that consolidates the differences in the needs of market actors through the amounts of cash taken over or handed out. In contrast, since the credit institutions and the Post Office have been allowed to maintain stocks carried in the books of the central bank<sup>10</sup> and need not turn to the MNB for stock consolidation on a daily basis but they can equalize the differences in their positions among themselves through cooperation, the central bank only needs to manage stock differences resulting from seasonal fluctuations and the replacement of unfit notes. This does not mean that the MNB would not have logistical stocks, it merely reduces its role in daily/weekly stock consolidation, replacing it with consolidation between seasonal periods.

As one of the most important consequences of the reduced operative role of the central bank, the **cooperation between the banks and the Post Office** (i.e., in practice the smooth operation of the interbank market) is **one of the most important efficiency consideration in the operation of the network**. If the MNB as an actor with a seeded network position is to reduce its day-to-day operative logistical role (primarily in stock consolidation), it must have the important objective of promoting interbank trading through the shaping of the regulatory environment and through its fees policy alike. In recent years, in order to promote cooperation between network participants, the MNB has adopted the following key measures that have proven (or will prove) successful in the medium-to-long run:

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<sup>7</sup> In addition to the network distribution performed before, their activities now extended also to demand planning, inventory management and banknote processing.

<sup>8</sup> By now the role of the MNB in the recycling of cash has declined so much that the return frequency of banknotes in Hungary is around 1, meaning that on average each banknote “returns” to the central bank’s processing machines once a year. In respect of banknote processing, the division of labour between the MNB and cash logistics service providers is 20%-80%, that is, the central bank processes approximately 1/5th of the cash in circulation, the rest being reissued by other providers.

<sup>9</sup> The balance of the cash deposited to and withdrawn from them at the end of each banking day

<sup>10</sup> Due to the different market behavior, value and risk of banknotes and coins, there is a fundamental conceptual difference between the notes-held-to-order and coins-held-to-order schemes. Essentially, the stock of banknotes held by market actors (only commercial banks and the Post Office) is owned by the central bank but up to its maximum amount it is covered by funds on a subaccount kept at the MNB, thus if there is any deficiency compared to the value of the inventory on the books, the MNB can be indemnified immediately. Stocks of coins are maintained by cash logistics service providers, each provider managing them to consolidate the demands of the various banks and post offices. In this case, the MNB accepts bank guarantees or insurance policies with itself as the beneficiary as cover up to the maximum value of the stock.

- In the field of **coin logistics**, it has placed consolidation stocks with cash logistics service providers, which facilitates the equalization of the weekly and monthly seasonal fluctuations in demand for coins. Furthermore, in its business terms and conditions it has specified central bank availability that looks to assure maximum cooperation between the actors as the MNB is at the disposal of market actors only if the aggregate volume of their stocks fails to cover the actual demand.<sup>11</sup> In any other case, the actors must manage their requirements through transactions among themselves.
- **Encouragement of container-based banknote lodgement and withdrawal through the fee policy.** As mentioned above, the minimum unit the central bank accepts or pays out is one bundle of banknotes, i.e., 1000 notes of identical denomination. Naturally, the larger the logistical units used for the material flows among actors and between actors and the central bank, the more efficient the operation for distribution purposes, and the better the fit to the internal operating processes of the MNB. To this end, the central bank has introduced logistical units consisting of 200 bundles of banknotes (containers) in day-to-day cash operations. As credit institutions and the Post Office tend to have cash turnover of less than 200 bundles, they are unable to make use of the free container-based transactions for lodgements or withdrawals on their own but if 2-3 entities cooperate, the units can easily be filled. Considering that container lodgements and withdrawals are free while a fee of 0.3 HUF per banknote is charged for single bundles, there is a strong financial incentive for actors to cooperate.<sup>12</sup>
- By facilitating the **notes-held-to-order (NHTO)** scheme, the central bank continues to nudge cash circulation in the direction of the market, Essentially this means that credit institutions and the Post Office may hold cash in excess of their daily requirements without any interest loss. The greatest advantage is the increased security of supply and the greater efficiency of the cash cycle. The MNB considers the Dutch operating model to be the primary benchmark, where the central bank allows account holders to keep cash in their own repositories during the closing time of the settlement system For the central bank, the cover is the amount earmarked in the subaccount of the account holder that cannot be used at the account holder's discretion (MNB, 2010).  
For the network, the NHTO scheme is a momentous measure as the central bank may improve the efficiency of the operation of the interbank market and thus the material flows of the entire network by changing the system of incentives offered to market actors. Previously, market actors optimized their cash holdings based on the interest foregone whereas under this regime they will do so based on daily and weekly fluctuations in demand. Thus the efficiency of material flows may increase.

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<sup>11</sup> Under the market coin model introduced by the MNB from 2008 on in several steps, the MNB has set maximum and minimum stock levels for each service provider by denomination based on the historical demand figures of recent years. Furthermore, through its real time IT connection to cash logistics service providers, the MNB monitors the stock levels of each actor weekly, by denomination. If it finds that the coin withdrawal and/or lodgement demands it receives can be satisfied from the stocks held by market actors, it will reject the transaction and in its website it discloses in advance the availability of each denomination for the week concerned.. Thus in practice, the central bank participates only in the balancing stocks between special seasonal periods (outflow before the summer and Christmas, increased back-flow early in the year), and it replaces coins "falling out" of circulation (approx. 50-60 million pieces/year).

<sup>12</sup> In the case of lodgements, as the national bank also accepts multi-denomination containers, most banknotes arrive to the MNB in containers. In contrast, due to its own operating characteristics, the central bank supplies only single-denomination containers for withdrawals for the time being thus containerized cash withdrawals are less frequent than single-bundle transactions.

In the case of the MNB, the most important **resource** is the know-how accumulated, which is required for the preparation and implementation of cash-related strategic decisions and the performance of its regulatory, monitoring and quality assurance functions. Due to its special role in the network, this know-how of the central bank is completely unique, it is impossible to substitute, replace or duplicate (i.e., its copying by market actors is irrelevant). The changes in cash-related activities described in the previous paragraph also triggered major changes in the resources used by the MNB. Initially, the MNB needed significant physical (buildings, processing machines, etc.) and human infrastructure facilities to perform its daily cash logistics functions. However, as the operational tasks of the central bank diminished, it needed less and less human and physical resources. Accordingly, the MNB closed down its cash handling offices in the country and by now it has centralised its cash-related activities in a single, state-of-the-art facility, simultaneously reducing the headcount significantly. The gradual withdrawal of the MNB from day-to-day cash logistics brought to life new activities and competences in the organization as the complexity of monitoring and regulatory work has increased significantly. Accordingly, in terms of human resources, instead of manual workers with daily operative duties, the central bank now increasingly needs highly qualified experts, analysts and engineers to discharge its new network role as determined by itself. In terms of physical resources, the MNB tends to maintain “back-up” capacities<sup>13</sup> for business continuity reasons while redundancies have been minimized; indeed, in some critical cases (cash deliveries in emergencies, loss of facilities) it acquires services from the market. Resources worth noting include the IT system offering real-time client and settlement connection (WebeC) used since 2007, which facilitates on-line payment transactions vis-à-vis the MNB and the real-time monitoring of the MNB cash held to order by market actors.

### **Cash logistics service providers**

From the logistics point of view, cash logistics service providers are the most important players of the cash supply network. Practically 100 percent of the cash supply tasks for the branch and ATM networks of commercial banks and the Post Office maintaining accounts at the MNB<sup>14</sup> are performed by cash logistics service providers because, as explained in the previous point, credit institutions, their clients and the Post Office have outsourced all of their cash-related activities. In practice, as the role of the central bank in operative cash logistics diminished, the activity structure of service providers has expanded. Having grown beyond the cash transporting role initially fulfilled, now they perform complex solutions for their principals so that the physical and information processes between actors in the cash network are practically performed almost entirely by such service providers.

Like in many other countries, the market of cash logistics service providers is highly concentrated: G4S Ltd., the multinational firm with the largest market share, has a dominant role in cash supply in Hungary. Brink’s Plc., the subsidiary of another multinational, is also a large player but with a much smaller market share. The third notable market actor, JNT

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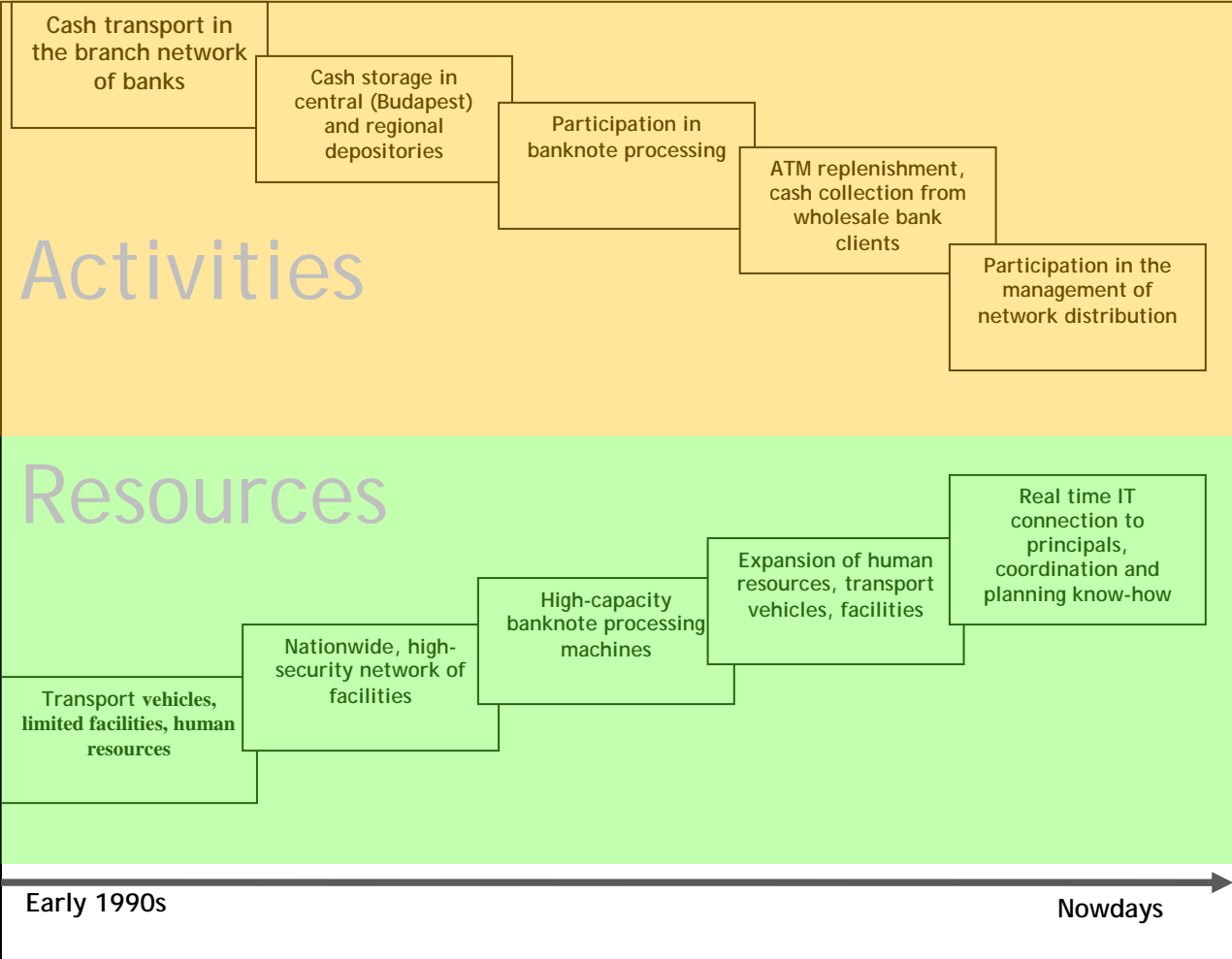
<sup>13</sup>The cash transportation capacities of the central bank are negligible. It maintains notable banknote processing capacities in case the processing facilities of a cash logistics service provider fail or if for certain banknote denominations a dangerous counterfeit impossible to detect by processing machines appears, thus recirculation outside the central bank needs to be suspended temporarily.

<sup>14</sup> Only credit institutions and the Post Office maintain separate accounts at the MNB, for which the MNB pays overnight interest on the cash lodged. With the exception of denomination exchange transactions, in the case of lodgements and withdrawals cash logistics service providers may not turn to the MNB in their own name, they can only perform transactions on behalf of their principals.

Security Ltd. is a subsidiary of Magyar Posta Plc. (the Post Office), consequently, it primarily supplies cash to post offices while also having contracts with some commercial banks and retail chains. In addition to the three “big ones”, there are three smaller actors present on the market focusing their activities on coin logistics and the processing of vouchers.

The aforementioned service providers are responsible for the “circulation” of cash on a daily basis between economic actors, in the following manner. At the end of each working day they collect the cash from the clients of credit institutions (mostly retail units) and from branches of the credit institutions and post offices, to process it at night at the central facilities (counting, sorting by genuineness and fitness). The processed genuine and fit quality cash is picked by destination from their depository and the next day they deliver it back to bank branches and retail stores or use it to replenish ATMs. Reject banknotes identified during processing are paid into the account of the credit institution/Post Office at the MNB; alternatively, if their principal needs cash, they withdraw the required amount from the MNB and transport it to the bank branch or post office. The next day the process starts all over again: households and enterprises withdraw the cash they need from ATMs, bank branches or post offices and use it to execute payment transactions. Thus cash, having changed hands, returns to retailers, then to bank branches and post offices, from where cash logistics service providers collect it, then process, store, pick and deliver it again. The expansion of the scope of activities performed by cash logistics service providers and the changes in the necessary resources are illustrated in Figure 4. In the figure, boxes in the yellow area symbolize activities, boxes in the green area the required resources. The overlaps of the boxes indicate that the activities or resources are created relying on each other, often connected to each other, in the course of the operation of the service provider and are present in the operations.

**Figure 4.** Changes in the activities of cash logistics service providers and the required resources from their market entry to these days



**Source:** own illustration

**Credit institutions and the Post Office**

We regard credit institutions and the Post Office so-called professional or wholesale actors as the central bank gets the necessary amount of cash to households and enterprises directly through them as intermediaries and they are the only entities the MNB has contacts with during cash operations. As noted earlier, the daily cash positions of the various credit institutions and the Post Office vary significantly. Consequently, there are so-called “depositing” banks in the supply network that tend to have surpluses all the time and enterprises are generally overrepresented in their client portfolio. The so-called “dispensing” banks are the ones that tend to lodge less cash than they withdraw. The latter group tends to serve households. In addition, there are intra-month fluctuations<sup>15</sup> in the cash demand of credit institutions and the Post Office: at the beginning of the month, when citizens get their salaries or social transfers, the cash demand of professional actors tends to grow significantly,

<sup>15</sup> Moreover, there are also seasonal fluctuations within a year, which is related to (national) holidays and public holidays.

then by the end of the month the cash “flows back” to actors through retail trade and, again, the Post Office. The interbank cash market<sup>16</sup> has been a good initiative of the sector to offset the differences between the demand arising from the different cash positions of credit institutions - typically between the clients of a single cash logistics service provider - but its operation is less than perfect, therefore the consolidation role of the MNB explained above is needed. Furthermore, several initiatives of the MNB to increase efficiency (among others, the structure of the fee policy, the design of terms of service of the central bank and the use of cash-held-to-order arrangements) also serves to promote more intensive cooperation between professional actors.

As mentioned earlier, with a few exceptions commercial banks have outsourced cash-related activities to cash logistics service providers and in most cases they have retained only the management decisions. This also means that they do not possess the resources necessary for the performance of operative cash management activities, they only hold the know-how - and the IT connection - that they need to determine the daily cash demand of their own branches; in addition, they arrange for the cash supply of their (mostly) corporate clients. This “delegation of activity” is most notable in the operation of ATMs because all the information, know-how and physical infrastructure necessary for running the ATM network is concentrated in the hands of the cash logistics service providers. Often banks do not possess even the essential security information required for the replenishment of an ATM. This delegation of activity and responsibility is probably cost efficient for the banks under normal conditions and assures high standards of cash supply. In the long term, however, it is worth considering how the majority of commercial banks would be able to react if their logistics supplier were, for some unforeseeable reason, unable to provide adequate quality services and whether the excessive dependence of the service providers would render banks vulnerable and jack up logistics costs. To some extent, the diversification of the service provider portfolio could be a solution to this problem but in the present structure of the market the two smaller service providers do not have the physical and human resources that would allow them to take over the responsibilities of the largest actor.

## **Enterprises, retail chains, households**

The most numerous group of actors in the cash network consists of enterprises and households, who obtain cash in the course of their payment transactions as clients of a bank or the Post Office, then they “re-channel” the cash to retailers and service companies as they consume. As a result of its special measure of value function, money follows through payment transactions, mostly in the form of cash as established in an MNB study conducted in 2010. By its nature, the use of cash does not require users to possess special activities or resources<sup>17</sup>.

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<sup>16</sup> If on a certain day the principal does not need banknotes anywhere in his network, it has two options. It may sell (exchange) the bundle of banknotes on the morning “physical delivery” cash market to/with another credit institution that has the opposite position. Alternatively, it may have it delivered to the central bank. Account holders may decide between recirculation, sale to other actors or delivery to the central bank at their discretion, depending on their business interests, taking into account the fees of the central bank, transportation costs, daily demand etc.

<sup>17</sup> In this respect, checkout counters are a borderline case because their existence is required primarily for the accurate settlement between the customer and seller, though of course cash handling is an important responsibility in retail facilities. In most cases, large retail chains also have contracts with cash logistics service providers, thus they are responsible only for intraday cash handling operations.

In addition to its use in normal transactions, we should also mention the relationship of cash with the hidden economy. Because of its anonymity, it is the most suitable tool of payment for illegal transactions and for the accumulation of income from the hidden economy. The MNB considers it possible for several reasons (see Odorán-Sisak 2008; Bódi-Schubert, 2010) that in the second half of the 2000s (between 2004 and 2009) one component of the dynamic growth of cash demand in Hungary was the expanding cash need of the hidden economy. Such use of cash, however, endangers the original welfare function of cash as the state does not make cash available to economic actors to allow them to engage in illegal transactions that in most cases cause severe losses to the state itself.

## Summary of network layers

In the previous points the most important layers of the Hungarian cash supply network were presented. In this chapter, in a summary chart, I review once again the key processes of network operation and analyze the points of friction that can be identified between the actors following from the operating logic of the network. In Table 1 the actors, activities and resources in a systematic layout are presented.

**Table 1.** Actors, activities and resources of the cash network

Actor	Activity	Resource
Central bank	Following from its key network management role: <ul style="list-style-type: none"> <li>- Cash related strategic decision making;</li> <li>- Issue of cash, strategic inventory management</li> <li>- Withdrawal and destruction of reject banknotes</li> <li>- Retreat from daily operative logistics: declining level of banknote recirculation and stock consolidation.</li> </ul>	<ul style="list-style-type: none"> <li>- Accumulated specific know-how</li> <li>- Centralized, modern operating infrastructure - Logistics Centre</li> <li>- Human infrastructure: shift towards the use of highly qualified expert resources</li> <li>- IT system providing real time connection with network actors</li> </ul>
Banks, Post Office	Control of network distribution and banknote recirculation by outsourcing material processes	<ul style="list-style-type: none"> <li>- Small number of human staff, primarily experts</li> <li>- Teller systems supporting internal distribution within the network, IT connection to MNB and service providers</li> </ul>
Cash logistics service providers	Activities expanding parallel with the shrinking role of the central bank: physical execution of material flow between network actors, banknote processing, recirculation and distribution in the branch and ATM networks of banks and the Post Office, as well as between corporate (retailer) customers	<ul style="list-style-type: none"> <li>- Operative know-how necessary for the performance and control of material flows</li> <li>- Extensive physical infrastructure: banknote and coin processing machines, facilities, security systems, transport equipment</li> <li>- The majority of human resources work in operations</li> <li>- IT connections with banks and the MNB</li> </ul>
Enterprises, households	They “only” use the cash in their payment transactions. Larger retail chains and other retailers have typically outsourced their cash distribution to service providers	Specifically cash-related resources entail retailers’ cash registers but such actors typically have no resources dedicated for this purpose.



## Evaluation of network paradoxes

In this chapter the appearance of network paradoxes will be evaluated. As it can be seen from the details of the case study, the Hungarian cash network can be considered as a special one, because of the regulatory role of the central bank. At first the network opportunities and limitations will be discussed, after it the influencing opportunities and the last point will be the control function.

### Opportunities and limitations of the network

The introduced regulatory role of the central bank can be considered as a network development tool and a strict constraint as well at a time. As the case study has shown, in the short term there is a big difference in this institutional-business network comparing to the “classic business ones”. Because deriving from its regulatory role, the central bank has a significant opportunity to influence network processes easily in order to enforce its own aims and expectations. The central bank can regulate the other market players’ behavior by its decrees, fee policy and terms and conditions of its cash service. The other market players has no or very limited option to modify the content of these regulation tools, they have to follow the instructions, otherwise sanctions will be implemented by the central bank. But in the long run the central bank can not create such kind of regulation that does not take the network structure into consideration. The MNB can not act on an arbitrary way, because if it does this, the regulations will not be applicable and fit to the surrounding network environment. That means if the MNB’s actions would be too opportunistic, they couldn’t be executed, and that’s why they could not reach their original influencing effect.

So we can say that the central bank can be considered as an enhanced key node because of its regulatory role, but in the long run the given characteristics and the structure of the cash network limits its influencing opportunities. As it was shown in the case study MNB has decided to change its operating strategy and decrease its involvement in daily market operation processes in 1995, but till the early 2000s almost nothing has happened with the existing network routines. The new strategy – change from service provider operating model to involving one – became feasible only after the logistic service providers and the commercial banks developed and broadened their resources and activities. Another example for the limitation effect of the network is the container-based logistic service of the MNB. Since 2009 MNB forces its clients by its fee policy to cooperate with each other and use containers for payment transactions. But on the withdrawal side only 45% of the transactions are made by containers, because in most of the cases the value of the commercial banks’ cash demand is below the container value<sup>18</sup>. So the MNB realized that the fee is not enough motivation for the wholesale market players to choose the containers instead of the traditional sacks. In order to fit to the market characteristics from 2012 the central bank decided to reduce the standard quantity of the containers from 200 thousand to 100 thousand pieces of banknotes in case of high dominations.

But this regulatory tool/power of the central bank sometimes functions as a development tool relating to the commercial banks’ and logistic service providers’ operation. The regulations and the reducing logistic operation of the MNB can initiate the other market player’s innovation activity to develop their current processes and resources in order to be able to fulfill the legal instructions.

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<sup>18</sup> A container must contain 200 bundles – 200 thousand pieces– of banknotes on the withdrawal side.

Summarizing the above we can state that in short term horizon the institutional network node's has much extended opportunity to influence the network's operating processes and resource-allocation comparing to the "traditional" business nodes. But in long term horizon the network paradox is valid, every node's opportunities is limited by the network's structure and basic characteristics.

### **Influencing possibilities of the network**

As it was introduced in the case study, the central bank has special influencing tools – decrees, fees, client service's terms and conditions – guaranteed by law. Comparing to other business network this is a significant difference, because this extreme influencing opportunity is a static one, and does not change in time. This influencing ability of the MNB can be considered as a powerful tool, which can never be as strong as a command in a hierarchy. But deriving from their key role in the network division of labor, the logistic service providers have also a strong influencing effect, because they are responsible for the smooth function of network routines on operation level. And because of their strong lobby-power the commercial banks' and the Hungarian Post's influencing power is also significant.

So the influencing effect among these nodes can be described as a continuous circuit: the MNB issues regulations in order to achieve changes in the market player's behavior, the commercial banks and the logistic service providers implement these regulations into their practice. But this new practices - especially in the medium and long run – generates new activities among these nodes, that changes the network operation and/or structure as well. When these changes hit a certain level, the central bank acts again and make some new changes in the existing regulation. So in the long rung this enhanced influencing opportunity of the central bank is mitigated by the other key node's interaction. And if the central bank does not involve the stakeholder market players in its regulation process, it can happen that the influencing power of the output instructions will be limited.

Finally we can say that the institutional node of the network has a static, enhanced influencing opportunity, so in the short run its expectations can be expressed easily. But in a longer time horizon, the other network nodes can also generates changes in network processes, so there is a mutual influence among the institutional and the private business nodes.

### **Power and control options of the network**

The power relations of the actors are particularly important for the operation of the network. According to Lukes (1974), power is an ability to influence the interests of another party adversely, without his consent, in order to pursue our own goals and interest.

In the Hungarian cash network we have identified the following power nodes and interdependencies, which have a fundamental impact on the strength and manner of network cooperation:

- The central bank can be regarded as the major power centre in the cash network because it has tools guaranteed by law, highly unusual in commercial life, through which it can directly influence the behavior of actors and control them in its own interest. As a peculiarity, the whole configuration of the network depends fundamentally on the decisions of the central bank; nevertheless, the MNB must adapt to the characteristics of

the network when making such decisions. In its decision making, the central bank is not independent of network effects, it must adapt to market characteristics and processes but this “counter-effect” is considerably weaker than the dominance of the MNB enshrined in law. The use of containers in central bank transactions affords a good example for the ability of the network to constrain the power of the central bank. Banks and the Post Office tend to use containers with 200 bundles of mixed denomination for lodgements with the central bank because this promotes their cost efficiency and is the best fit to their internal procedures. In case of withdrawals of cash from the central bank, actors typically have not use for 200 bundles of the same denomination even if they work in cooperation with others. Thus no matter how much the central bank favors containers or, indeed, uses administrative measures to promote their use, network processes do not support their across-the-board use.

- There is a certain dominance in the relationship of commercial banks, the Post Office and cash logistics service providers on the side of the latter. This arises from the fact that the banks and the Post Office as principals outsourced almost their entire cash operations, thus in the short term they do not have the physical resources or the know-how to perform cash-related activities; furthermore, the costs of switching service providers is high and its possibility is limited due to the structure of the market. Thus at present there is a moderate dominance on the side of service providers, which in practice manifests itself mainly as a source of manipulation (influencing the services offered and their pricing).

In summary, the central bank has peak power that is unusual in business, which it can use to directly influence the behavior of network actors, but despite this power concentration it is still unable to act independently of network effects. I consider the power of the central bank in the cash network to be special because this power is enshrined in law, thus its level remains constant both in the short and long term. In contrast, in business relationships the power situation can generally be changed by the parties in the long term. The central bank exercises this power over other actors primarily in its decisions concerning regulation, control and the terms of service but it is also forced to adapt to long term market trends. At present more power concentration can be observed on the side of cash logistics service providers vis-à-vis banks but its extent cannot be compared to the power of the central bank and it can change in the medium and long run through the decisions and market behavior of the actors.

## Summary

This paper introduced the structure of the Hungarian cash network, and highlighted its key layers and processes. In generally we can say that the regulatory role of the institutional network node generates special patterns, but the basic network paradoxes are also valid in this case as well.

The special rights of the institutional network nodes modify the appearance of the network paradoxes especially in short run horizon, but in the long run the basic characteristics of them do not differ from the classic business ones significantly. Table 2 below systematizes the difference of network paradoxes in the analyzed institutional context comparing to the classic B2B context.

**Table 2.** Appearance of network paradoxes in the analyzed case

Appearance of network paradox	Short run	Long run
Opportunities and limitations	Extended opportunities for the institutional node that highly limits the other node's opportunities.	Balanced opportunities for all nodes; the institutional node's activity is constrained by the network structure. In generally no significant difference comparing to B2B networks.
Influencing effect	Central bank owns great variety of network influencing tools deriving by law. Other nodes have lower opportunity to influence central bank's behavior.	Significant interplay among network actors, the activity of business nodes influences the institutional member's behavior and vice versa.
Control/power	There is some kind of "superpower" on central bank's side. The institutional member can control the other nodes' activity by formal (legal) and informal actions.	The central bank's extended control opportunity is still valid, but the other network nodes also have the opportunity to control the central bank's actions.

As the summarizing table has shown, in short term horizon the network paradoxes in institutional context can differ from business one, because the institutional node can have extended opportunities, control and influencing options. But in the long run the appearance of the network paradoxes are almost the same as in a business context, none of the actors is able to steer the network processes continuously.

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