

Cost Optimization of the REM and HM Systems Electronic Access Channels

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*The global scope of letter-mail services which imply the manipulation by post in physical form is continuously diminishing. The explosive development of IC technologies, which is the most obvious in the development of the Internet and mobile telephony, caused the often traditionally oriented PPOs (public postal operators) to opt for the development of their core activity in the field of integrated IT solutions. Following the specific requirements of the users, who ceased to use the traditional written communication owing to the electronic access channels (Internet and mobile communications, i.e. e-mails and SMS messages), the POs have no other option but to facilitate the electronic communication of users in order to keep letter-mail items within their systems and thus protect their income. The two systems which enable users to send the electronic data are **Registered Electronic Mail (REM)** and **Hybrid Mail (HM)**.*

*The implementation of the model of integration of these two systems, that is reflected in the use of integrated **electronic access channels** and which is the subject of this paper, has significant economic effects and technical justification for the public postal operator.*

1. operations of the public postal operator's REM and HM systems

Registered Electronic Mail (REM) is a type of electronic service that ensures an integrated electronic data exchange between end users on the principles of the exchange of registered mail in a physical form. The basic features of this service are that it is entirely electronic and provides a reliable and certified data exchange between the mailer, the service provider and the mailee. In comparison with the traditional service of mail exchange, the REM system provides the service of confidential electronic communication that contains both the mailing evidence and receiving mail evidence between previously authenticated users. Evidence and archival of all the events and operations is performed in each section of the REM system, in the transfer or exchange of electronic mail, thus ensuring a reliable tracking of the mail status. Hence the REM system can be said to be an electronic version of traditional registered mail in the physical form, significantly improved through strict authentication procedures and a high level of protection of the mail integrity and confidentiality, which provides irrevocable evidence on all the events and operations in the system implementing modern cryptographic technologies. [1],[3],[4]. At the congress held in Seoul in 1994, the *Universal Postal Union – UPU* (www.upu.int) adopted a decision on forming the *Telematics Cooperative*. The reason for establishing the Cooperative is to help postal operators improve business processes through the modern information and communication technologies implementation. The task

of the Telematics Cooperative is to collaborate with postal operators in developing new electronic products and services to be offered to customers. The Telematics Cooperative includes three work groups:

1. *The international Mail Services – IMS User Group*. The task of the **IMS** group is to define the strategies and business processes for the electronic tracking of mail (EMS, letters and packages) in the international postal handling.
2. *The International Financial Services – IFS User Group*. The task of the **IFS** group is to define strategies and business processes for the international money transfer systems.
3. *The Advanced Electronic Services User Group – AES User Group* that comprises the following subgroups:
 - 3.1 Subgroup for **UPU** standard S43 “*Secure Electronic Postal Services – SEPS Interface Specification*” whose task is to define the interface for the *Electronic Postal Certification Mark – EPCM* and other S43 services such as *Postal Registered Electronic Mail – PReM*.
 - 3.2 Subgroup for the *Global Hybrid Mail*
 - 3.3 Subgroup for **RFID** – *Radio Frequency Identification*
 - 3.4 Subgroup for the Internet .post Top Level Domain – **TLD**.
 - 3.5 Subgroup for *Case Study Knowledge Base*

The Postal registered electronic mail (PReM) is to provide a confidential and certified electronic commu-

nication between the mailer, the public postal operator and the mailee. In addition, similarly to the REM system, the PReM system is to provide evidence and archival of all the events and operations in the system. The PReM system comprises the following features:

- **secured message forwarding and delivery** without compromising or change in the contents (*mail integrity guaranteed*) between authenticated and irrevocable users (*mailer and mailee*) and the PReM service provider – public postal operator,
- **evidence generation**, due to which any important events in the system are recorded,
- **event notification**, by which individual recorded events or operations in the system are sent to corresponding parties in the process,
- **archival of evidence**, providing the storage and safekeeping of the evidence for possible further search or analysis,
- **archival of messages**, providing the storage and safekeeping of the PReM system messages for possible subsequent search or analysis and

- **centralized search of authorized public postal operators**, providing the centralized service of yellow pages with integral information on authorized public postal operators. [1]

The architecture of the PReM system is defined using the conceptual model that consists of mailer, mailee, authorized third parties, authorized public postal operators of both the mailer and the mailee and the distribution point of the Trust list of public postal operators. The data on the mailer and/or mailee are stored in the Directory Server of the public postal operator and accessible to registered users following different criteria (*electronic address or name and surname*). To identify the authorized public postal operator of the mailee, the PReM system conceptual model assumes the presence of the point of exchange of “confidential/trust” public postal operators which contains the list of public postal operators maintained and announced by the Universal Postal Union. The mailer and mailee may be users of the same or different (this model is presented in *figure 1*) public postal operators.

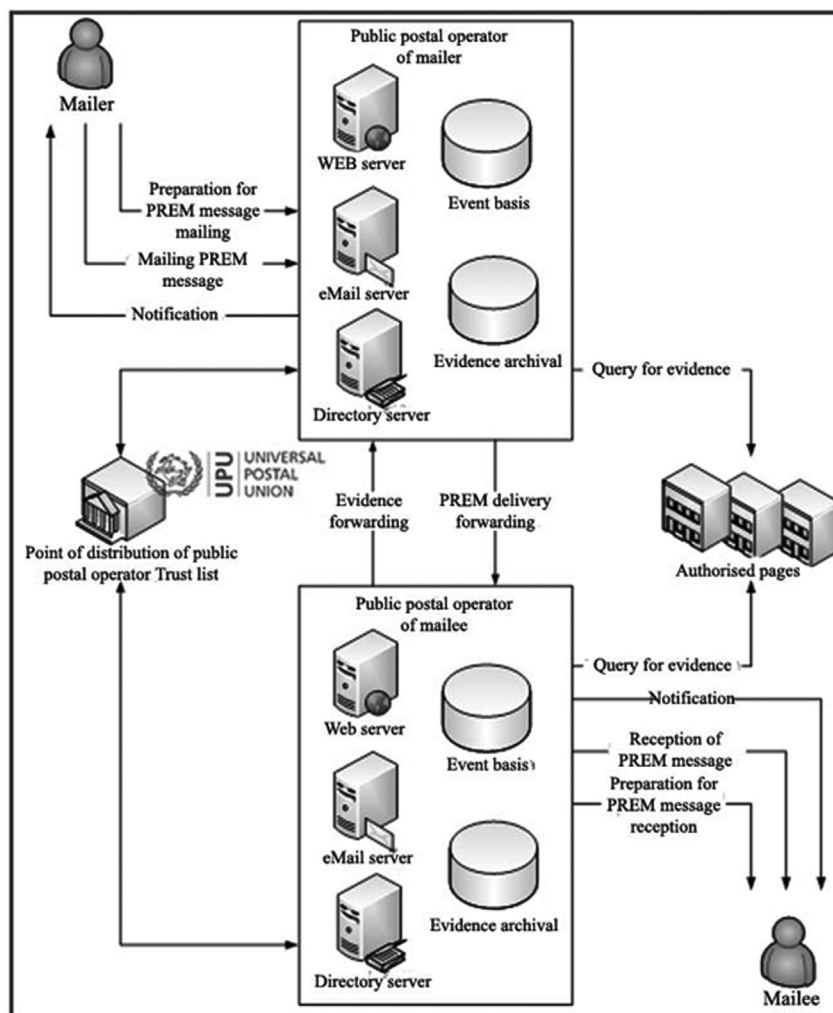


Figure 1. The PReM system conceptual model in case mailer and mailee are users of different postal operators.

Evidence generation of all the operations and transactions is the core characteristic of the PReM system. In order that these be provided, it is necessary that all the participants in the PReM mail forwarding process should be identified (*mailer, mailee, mailer's and mailee's public postal operators*) as well as that irrevocability of transactions between the participants in the PReM mail transfer be present. In view of the above, several authentication models can be implemented:

1. **Password-based authentication.** The use of user name and password or any other authentication mechanism with two factors is the first level of authentication model. The first step in this type of basic authentication is the access to service that means a direct authentication so that the public postal operator can check the identity of mailer or mailee.
2. **Electronic signature using electronic certificate.** This authentication model is not used only with mailer and mailee, but also with the public postal operator. The format and rules the electronic signature should satisfy are defined in *RFC 5280* and the European Directive *1999/93/EC*.
3. **Qualified electronic signature using qualified electronic certificate.** This authentication model is the highest level of identity management applied to the postal registered electronic mail users. In accordance with the *RFC3739, ETSI TS 101 862* and the European Directive *199/93/EC*, the user of the qualified electronic certificate has to identify himself in a direct contact on occasion of certificate issuing, whereas the medium for certificate storage has to be consistent with the *Secure Signature Creation Device (defined in European Committee for Standardization, CEN/ISSS workshop Agreement CWA14169)*. [1]

The implementation of different authentication models and identity management depend on the PReM service provider policy, however, the above-defined authentication models are recommended. It is certainly the right of the PReM service provider to choose the level of security mechanisms he wishes to implement in his PReM system. It is on the basis of the security mechanisms implementation that the level of trust among different public postal operators is determined.

Hybrid mail (HM) is a type of partially electronic mail exchange where, contrary to the traditional manner of mail forwarding, the mail contents is forwarded and transmitted in an electronic form, printed and packaged on a location in the vicinity of the delivery destination and finally delivered to the mailee in a physical form. In

this way, the combined electronic and physical method of mail delivery includes the technological phases of receipt, processing and preparation of electronic data, mail printing, putting the mail into envelope or packing it, addressing and delivery. Although the exploitation of the earliest hybrid mail systems dates back to the 1980s, it is only with the expansion of the Internet that its development has been intensified. This development was guided by the simplicity of sending the hybrid mail via the Internet, but also by a significant cost reduction in transport and processing. Without an integrative approach to service delivery, however, postal operators are unable to achieve a full potential of hybrid mail; consequently their success in the market is limited. The integration with the delivery network requires that the postal operator produce the mail in such a way that it is transport-, processing, and delivery-optimized. This means that the system decides where, when and how the mail will be printed. The option of where mail will be printed implies the implementation of the **distributed hybrid mail (DHM)**, i.e., the use of a number of distributive centres for mail printing and packaging, as well as the option of selecting one centre on the basis of the quality of its equipment or address data. [2],[3],[4]

Within the scope of activities of the Universal Postal Union (*UPU*) the *RL253 – Hybrid Mail* regulations were prepared, for hybrid mail standardization on the world level. Namely, more than 80 member states of the Universal Postal Union offer hybrid mail services in different forms and shapes. Hence the Universal Postal Union recognized the hybrid mail domain as a growing market for the postal industry in the period to come. Furthermore, in the current conditions of the world economy as well as under a growing intention to rationalize the world energy consumption and protect the environmental, hybrid mail fits perfectly as a business solution for the world postal organization in the 21st century. The *Global Hybrid Mail (GHM)* project is based on the idea of forming a global hybrid mail network that would allow for the member states of the Universal Postal Union to offer hybrid mail services beyond their borders. Owing to this network, end users would be in a position to access the network of international postal services via the Internet. Hence the Universal Postal Union has already defined hybrid mail as a possible postal service within the *Letter Post Regulations*. The next step in the **GHM** project is to define an integral regulatory framework and a business model for the Global Hybrid Mail network operations. The additional potentials of the Global Hybrid Mail network could be its integration with the electronic postal mark (**EPCM**) and other technologies for safe communication of electronic documents for

the purpose of supporting the definition and development of a hybrid version of registered electronic mail.

2. Electronic business models in electronic access channel management

Electronic business (*e-business*) is defined as purchase and sales of information, products or services via a computer network and as a support to any types of business transactions via a digital (*electronic*) infrastructure, that is, via electronic access channels. A mass development and implementation of the Internet as one of the most widely spread electronic access channels have motivated an increasing number of users, who are in search of a more economic and a more efficient manner of work, to exploit the opportunities offered by electronic business. Electronic business entails the exchange of standardized electronic messages between physical and legal entities in the procedures of negotiations, contracting, purchase, sales, payments, communication with administration and courts and performing other legally allowed business transactions. It is based on an efficient and modern organization of work, adjusted to implementation of modern information and communication technologies, use of the Internet in performing a majority of business transactions, organization and implementation of the modern information system, implementation of electronic signature and using the cryptographic mechanisms of protection. [5]

Electronic business differs from traditional business doing in that it eliminates time differences and geographical distance between business partners in the procedures of ordering, payment and delivery of goods and services. The business boundaries are in this way extended to goods and services that did not exist earlier – electronic products. The electronic business provides quality products to its customers, adjusted to their needs and at lower prices and a higher quality service. Electronic business models are varied, among them [5]:

1. **B2C – business to customer electronic business** that means the sales of goods or services to end users via electronic access channels. The task of this electronic business model is to expand the market and satisfy the needs of the existing customers both in the domain of sales of goods and services and in the domains of providing information, services and support in exploitation. This model includes services of fast and reliable communication, sophisticated design and data validity attestation. The basic form of this model of electronic business are automated *on-line* shops. The advantages of this business model are the following: time saving, high competitiveness, lower prices of goods, services and transactions.

2. **C2B – customer to business electronic business** is a model of electronic business in which the customer orders a product or a service from the service provider in that he places his order with the appropriate budget via electronic access channels, upon which the service provider places his offer.

3. **B2B – business to business electronic business** is a model of electronic business that implies the use of electronic access channels for sales or purchasing, as well as for a less expensive, faster and more reliable cooperation between business partners. This model is oriented towards a more efficient electronic support to the existing business activities and a high level of operation in the exchange of information, goods and services. The most common environment for the development of this electronic business model is the *Extranet*.

4. **C2C – customer to customer electronic business** is a model in which users perform the sales of goods among themselves, using electronic access channels. Basically, this model can be titled C2B2C as well, since the mediator charges commission, and the best example of this model is the *eBay*.

5. **B2A – business to administration electronic business** is a model that includes a large number of services in the fields of social welfare, employment, public registres, etc.

6. **C2G – consumer to government electronic business** is a model that includes a large number of services in the following areas: social insurance (provision of information and cash payments), health care (making appointments, provision of information on illnesses and payment of health care services), education (provision of information and distance learning), taxes (submission of tax declarations and tax payment).

7. **B2E – business to employee electronic business** is a model that provides the employees in companies with an access to varied information and services via electronic access channels. This channel is most frequently the *Intranet*, that is, an internal *web* portal accessed by the employees via a local computer network. This model also provides for the integration of the internal segment of business with the B2B or B2C models. It is in this way that a permanent replication of data between the internal and the external data sources is ensured, as well as data analysis and support in making decisions for the purpose of increasing the scope or quality of services. The aim of this type of electronic business is to improve the efficiency and eliminate

costs incurred in case the internal and the external systems are separated.

The electronic access channels for using and payment of the services of **integrated systems of registered and hybrid electronic mail** can be effected in various ways, which largely depends on the type of device the user accesses, but also on the location from which an access is made. It is, however, possible to classify the electronic access channels for access to the REM and PM integrated systems in the following way:

1. electronic access channel via **the Internet**,
2. electronic access channel via **mobile telephony**,
3. electronic access channel via **fixed telephony**,
4. electronic access channel via **user self-service devices**,
5. electronic access channel via two-way **cable-distribution systems**, that is, via interactive television (**VoD** – video on demand, **NVoD** – near video on demand).

Using these universal electronic access channels of the integrated REM and HM systems it is possible to access different services offered by these two systems, but also to pay for the services. *Table 1* presents a survey of electronic access channels of integrated systems, the interface electronic access channel, a possible method of payment for a service and the type of payment for the service. As can be seen in *Table 1*, the **Internet**, as an electronic access channel offers different methods of user access, such as *web-oriented application*, *electronic mail client* or *application for large users*. Simultaneously, the method of payment for the services of the integrated REM and HM systems via the Internet can be directly *on-line*, from the user's

bank account, by using a credit, a debit or a loyalty card, by sending an SMS message, or indirectly, by payment for the use of the Internet access service. Payments via the Internet electronic access channel means either a *prepaid* (characteristic of payments from bank accounts, by an SMS message or a loyalty card), or a *postpaid* manner of payment (characteristic of payments by a credit or debit cards or indirectly, with the Internet services bill). Billing integrated services, in case payments are made indirectly, payments of the Internet services bill, may be upon service (*in which case a number of transactions or services that are provided monthly is evidenced*), or lump sum payment, the so-called *flat rate* service.

As an electronic access channel, **mobile telephony** offers the user an opportunity of using a wide variety of interfaces. Starting from the IVR, or a contact centre to which, in the same way as in fixed telephony, the users access and communicate via a voice channel, to SMS messages, to WAP Internet portal or a specialised mobile application for bill payment. In case of mobile telephony, or in case of payments in mobile banking, there is a difference between *micro* and *macro* payments. In the former case, the payment is effected from the account of the mobile subscriber (*prepaid* or *postpaid*) by which the bill for mobile telephony increases for the amount to be paid for the bill of the integrated REM and HM system service. Due to a relatively limited indebtedness of the mobile user, this model is suitable for the *prepaid* method of payment for the integrated services of the REM and HM systems. The latter method entails the order for payment of integrated services of the REM and HM systems from the bank account of the debit or a credit cards of the user.

Electronic access channel of integrated REM and HM (DHM) systems	electronic access channel interface	Method of payment for service	Type of payment for service	Electronic business model
Internet	<ul style="list-style-type: none"> • web oriented application, • electronic post client, • application fro large users. 	<ul style="list-style-type: none"> • bank account, • credit or debit card, • SMS, • loyalty card, • internet service bill (on service or flat rate). 	<ul style="list-style-type: none"> • prepaid, • postpaid. 	<ul style="list-style-type: none"> • C2C, C2B, C2G, • B2C, B2B, B2E, • G2C.
Mobile telephony	<ul style="list-style-type: none"> • WAP, • SMS, • mobile application, • IVR, • contact centre. 	<ul style="list-style-type: none"> • micro payment, • macro payment (bank account, credit or debit card). 	<ul style="list-style-type: none"> • prepaid, • postpaid. 	<ul style="list-style-type: none"> • C2C, • C2B, • C2G.
Fixed telephony	<ul style="list-style-type: none"> • IVR, • contact centre. 	<ul style="list-style-type: none"> • Bill for fixed telephony services (on service or flat rate), • račun u banci. 	<ul style="list-style-type: none"> • prepaid, • postpaid. 	<ul style="list-style-type: none"> • C2C, • C2B, • C2G.
Self-service device	<ul style="list-style-type: none"> • Self-service device application. 	<ul style="list-style-type: none"> • credit or debit card, • loyalty card. 	<ul style="list-style-type: none"> • prepaid, • postpaid. 	<ul style="list-style-type: none"> • C2C, • C2B, • C2G.
Interactive television	<ul style="list-style-type: none"> • Electronic programme guide of a digital television connection. 	<ul style="list-style-type: none"> • Bill for the CDS system services (on service or flat rate), • credit or debit card, • SMS, • loyalty card. 	<ul style="list-style-type: none"> • prepaid, • postpaid. 	<ul style="list-style-type: none"> • C2C, • C2B, • C2G.

Table 1.
Universal electronic access channels for an integrated access to services of the integrated REM and HM (DHM) systems.

This type of payment is suitable for both *prepaid* and *postpaid* payments of integrated services of the REM and HM systems as it does not affect the mobile telephony services bill.

Self-service devices, too, can serve as electronic access channels to access the services of the REM and HM integrated systems. These devices, depending on their hardware properties and a primary method of use, are called ATMs, postomats, automatic cash machines etc., and they enable the access to services via a user application of the device itself, while payment is made using a credit, a debit or a loyalty card. In case the self-service device is used to access services, the most common way of payment is *prepaid*, that is, the user pays for the service prior to using it. The self-service device, however, can serve for *postpaid* payments of bills for using the services of integrated REM and HM systems (e.g. *the overall monthly debits*).

Finally, the implementation of two-way **cable-distribution systems (CDS)** on the basis of which various bidirectional services were developed (*cable Internet, interactive television*), opened the prospects for using a television set as an interface of a electronic access channel. Namely, interactive television, that is, the application of an electronic program guide of a digital television set (or an analogue television receiver combined with an appropriate set-top box) is an electronic access channel for using the services of the REM and HM integrated systems. Payment for the service can be either *on-line*, using the credit, debit or loyalty cards, sending an SMS message, or indirectly, paying the bill for the cable-distribution system services.

In addition to the survey of electronic access channels for the REM and HM integrated systems, *Table 1* presents a potential model of electronic business. As seen in the table, contrary to the Internet that supports almost all models of electronic business (C2C, C2B, C2G, B2C, B2B, B2E, G2C) and is a universal infrastructure for electronic business, mobile and fixed telephonies, a self-service device and interactive television are electronic access channels for individual users – citizens that use these devices to access the integrated services of the REM and HM integrated systems, communicating with other users, legal entities, or state administration, local autonomy and administration (C2C, C2B, C2G).

3. The REM and HM systems integration in electronic access channel optimization

The integration of the REM and HM systems of public postal operator offers the following significant advantages to the users of once individual, non-integrated systems:

1. Option of choice of the integrated access of these two systems, as to whether they need to perform an integrated electronic communication, that is, to send the recipient the registered electronic mail, or they want the electronically sent mail to be delivered in a physical form, through a hybrid mail system. It is in this way that **added value** is obtained for the users of these systems who have an opportunity, due to the integration of the systems, to choose both the method of delivery and the characteristics of their mail, and in a simplified way.

2. Option of choice of the speed of mail delivery and attributes. The speed of mail delivery is highest in the REM system, followed by the DHM system, and lowest in the HM system. This is understandable because communication in the REM system is entirely electronic, in the DHM system it is electronic to a large degree, while in the HM system electronic communication and physical delivery are present in equal degrees. On the other hand, the opportunity to manage the mail attributes which is mostly reflected in an additional personalization, in the choice of the type of an envelope and the manner in which the mail will be put into it, in the use of colour print and in, perhaps, additional annexes and information is best in the HM system, slightly inferior in the DHM system and the least in the REM system.

3. **Cost reduction** in mail delivery using the REM system delivery channels, with retaining the technology of mail delivery in a physical form via the HM system to those users who are not willing to receive their mail in an electronic form. This option is very important for the large REM and HM (DHM) system users (*of "billing" type*) because they are offered a simple way in which they can choose the format in which their mail is to be delivered – electronically or in a traditional way. Such users are mostly large telecommunication companies, electrical energy distribution service providers, utility companies, business banks, insurance companies or local tax administrations that generate a large amount of mail on a monthly basis.

4. A faster delivery of mail using the REM system delivery channels and consequently faster and better **economic**, i.e., **financial effects** the post has to achieve: a faster collection, reduction in the market marketing time or a more efficient distribution of information. At the same time, by using the REM and HM systems potentials for mail personalization and inserting advertising flyers, the system users are given an opportunity to efficiently manage the marketing campaigns and earn additional incomes (*specific financial effects*).

5. Mail archival option. The option of mail archival offers the system users two types of facilities. First, the REM system allows the user a subsequent access to the digital archives which are electronically signed and assigned a time stamp. Second, the HM or DHM systems allow the user to receive the duplicate of his mail in an easy and user-friendly manner. These facilities are in fact **value added services** for the integrated system users.

6. Environmental protection as a result of the REM system implementation due to the reductions in exploitation of paper forms and pollutant gases emissions in the transport of mail in a physical form, on one hand, and prevention of digital divisions and human rights protection for those mailees who do not use electronic communications and still receive their mail in a physical form via the HM or DHM systems, on the other. These facilities are an additional motive to large users of the REM and HM (DHM) integrated systems to join the environmental protection campaign, and simultaneously retain the same traditional method of mail delivery to their clients.

7. An option for the user to track the mail sent via the REM system electronic access channels to be prepared and delivered via the HM or DHM systems, first through the REM system, then through the subsystem for data receiving, processing and preparation in the HM (DHM) system and finally through the *track&trace* system of the public postal operator. It is in this way that the users, regardless of the method of mail delivery, retain a very important option to use the services of tracking their mail status which is very important for building up trust between the service provider and the service user.

On the other hand, the integration of the REM and HM systems offers numerous advantages to public postal operators, among which the following stand out [6], [7], [8], [9], [10], [11], [12], [13]:

1. Both large users of the *“billing” type* and physical entities of the *“mailing” type* are in a position to receive their mail in a simple way, via the **integrated electronic access channels**. In this way, the existing users still feel that they use the “old” mailing systems they are used to, while the new users accept this integrated approach easily since they are offered the option of choice of the delivery method, together with the facility of tracking the status and monitoring the performance of both systems.

2. The option of different methods of data, or mail, processing and storage: the preparation of mail in dif-

ferent formats is conducted in the HM system, and archival and storage are performed in the REM system. It is very important for the public postal operator to offer all the **additional services** of mail archival, storage, processing, search, subsequent access, repeated mailing, formatting and personalization which he will find much easier due to the integration of additional services characteristic of the individual REM and HM (DHM) systems.

3. A significant operations improvement and simplification and a **less expensive exploitation** of integrated systems using the following options: a simultaneous data processing and different users’ mail generating either in electronic or in physical forms; an easy mail processing (*electronic data processing, sorting, clustering, inserting bar-codes and OCR inscriptions, addressing, archival*); automatic mail transmission (*to various devices for printing and packaging in different hybrid mail distribution centres, in different printing formats*); mail delivery management (*the options of mail delivery in either electronic or physical form, in a desired time space, in different physical formats, automatic marking of undelivered mail, or generating the status of undelivered or rejected registered electronic mail, the analysis of the address of undelivered mail and an option of subsequent delivery*); the option of document archival and delivery of mail duplicate; the option of organizing various marketing campaigns via different direct mail services with an option of choosing the form in which the mail will be delivered.

4. A significant **cost reductions** in planning, designing, development, exploitation, maintenance and management of electronic access channels and information systems, that is, a significant **economic justification**, due to the **integration of the REM and HM (DHM) systems** using universal electronic access channels and sections of information system that can be used for the needs of two systems (*e.g., subsystem for supervision and subsystem for collecting*).

5. An option of integrating the REM and HM (DHM) integrated systems subsystem for supervision and subsystem for collecting into an integrated information system of the public postal operator, thus gaining control over all technological and information resources, **process optimization** and **cost reduction**, and improving **economic profitability**. The integration of management and control elements of the systems with the operator’s information system (*implementation of electronic business models and strategies*) which contains the software for enterprise resource management –

ERP, customer relation management - **ERM**¹ and supply chain management – **SCM**, is a powerful information integration that results into an easier and efficient management of an integrated system, reliability improvement, **profitability** and **productivity**, **reduces costs** of development, exploitation and maintenance, and also provides control of all the technological and information resources as well as **process** and **cost optimization**.

6. A significant **improvements in profitability, competitiveness, success** and a better market positioning of a modern public postal operator, due to the implementation of the universal electronic access channels and the REM and HM systems integration.

4. Cost optimization of integrated REM and HM systems electronic access channels

All the reasons for the introduction of integrated electronic access channels of the REM and HM systems are marginal in comparison with the cost on transaction (*economic aspects of optimization*). For the purposes of cost optimization analysis, a graph in Figure 2 is used, and it shows that the cost of one transaction (*banking in this case*) via the Internet or via the WAP service of the mobile telephony is by as much as 97% lower compared to the cost of transaction in the bank branch office! [14] This can be easily understood because, in case of access via the Internet or via the mobile telephony, the user himself acts as a liquidator, he purchases and maintains his equipment (*computer or mobile phone*) and covers all the costs of connection with the bank (*advantages of electronic business, i.e., using electronic access channels*).

The relations among costs of transactions effected via the counter vs. the electronic access channel, presented in the graph in Figure 2, are also applied in the public postal operator's business cost optimization incurred during the use of integrated electronic access channels of the REM and HM systems. The number of

processed letter-mail (*received, processed, transported and delivered*) in a physical, traditional form in 2010 in the PE of PTT communications "Srbija" approximated 290,000,000, and the cost of processing for one letter amounted to 25 dinars. [5]

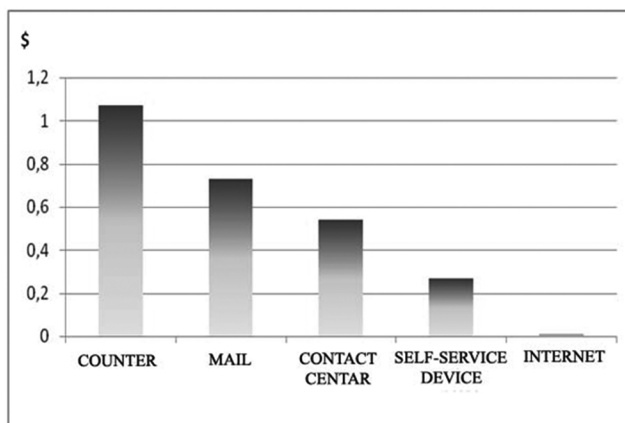


Figure 2. The graph of bank transaction costs depending on the type of electronic access channel. [14]

The plan of the company for 2011 is to develop integrated REM and HM systems using integrated electronic access channels, among them the contact centre, the self-service device (*postomat*) and the Internet primarily. In order to forecast cost reductions in the business of this operator in the next five years, it is possible to assume the amount of that will, instead in a physical form, be realized via an electronic access channel. Table 2 presents the parameters taken in this analysis for three different cases, i.e., forecasts (moderate, pessimistic, optimistic) based on the data available for the PE of PTT communications "Srbija" for 2010 (*statistically basic year is 2010*).

The graph in Figure 3 shows that the cost reductions in the business of the PE of PTT communications "Srbija" in the five-year period, and according to forecasts, ranges from 1.5 to as much as 3.2 billion dinars.

¹ Blery, E.K.&Michalopoulos, M.G., 2006, "An e-CRM application in the Greek telecommunications sector", *Management – journal for management theory and practice*, vol. 11, no. 44, pp. 55-60. [11]

Year		I	II	III	IV	V
Moderate forecast						
Internet	%	6	12	15	18	20
	number	17,400,000	34,800,000	43,500,000	52,200,000	58,000,000
Self-service device	%	1.5	3	4	4.5	5
	number	4,350,000	8,700,000	11,600,000	13,050,000	14,500,000
Contact centre	%	3.5	7	9	11	12
	number	10,150,000	20,300,000	26,100,000	31,900,000	34,800,000
Pessimistic forecast						
Internet	%	3	6	8	9	10
	number	8,700,000	17,400,000	23,200,000	26,100,000	29,000,000
Self-service device	%	1	2	2.5	3	3.5
	number	2,900,000	5,800,000	7,250,000	8,700,000	10,150,000
Contact centre	%	2	4	5	6	7
	number	5,800,000	11,600,000	14,500,000	17,400,000	20,300,000
Optimistic forecast						
Internet	%	7	14	20	23	25
	number	20,300,000	40,600,000	58,000,000	66,700,000	72,500,000
Self-service device	%	3	6	8	9	10
	number	8,700,000	17,400,000	23,200,000	26,100,000	29,000,000
Contact centre	%	4	8	11	13	15
	number	11,600,000	23,200,000	31,900,000	37,700,000	43,500,000

Table 2. Percentage and number of transactions via integrated electronic access channels in the five-year period

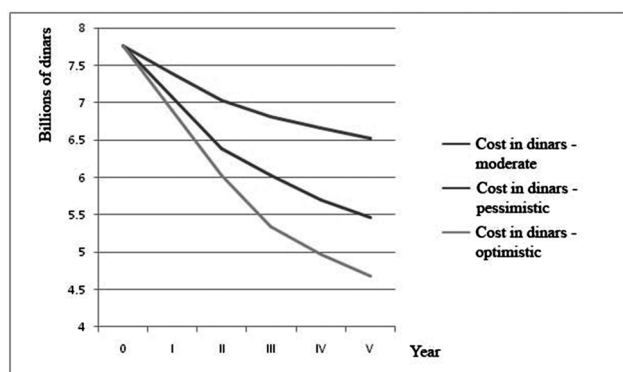


Figure 3. Cost reductions in the business of the PE of PTT communications "Srbija" in the conditions of integrated REM and HM systems electronic access channels implementation.

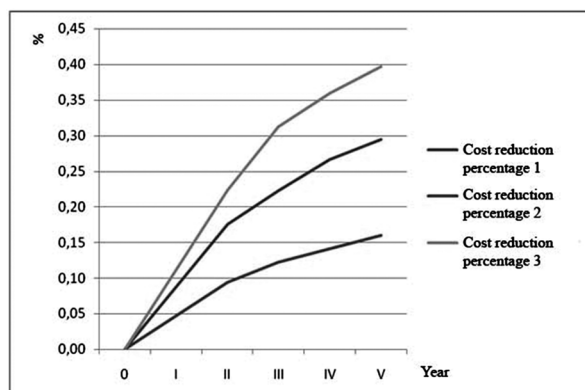


Figure 4. Percentage of cost reductions in the business of the PE of PTT communications "Srbija" in the conditions of integrated REM and HM systems electronic access channels implementation.

5. Conclusion

The integration of REM and HM systems provides for the optimization of costs, hence it is highly economically justified in the conditions of implementation of integrated electronic access channels of the two systems. These channels can be implemented in a number of ways, depending on the type of device the user chooses to access the services, but also on the location from which the user accesses these services. The observed model of integrated electronic access channels classifies the following accesses: the Internet, the mobile and fixed telephonies, self-service device, and a two-way CDS system. Contrary to the Internet that supports nearly all the models of electronic business and makes a universal infrastructure for electronic business operations, the mobile and fixed telephonies, self-service device and interactive television are the access channels for individual users – citizens, to access the integrated services of the REM and HM integrated systems, communicate with other users, legal entities or state administration, local autonomy and administration. The model of REM and HM systems integration described in this paper allows for the postal operator to **increase the scope of his services** and consequently his **income** [12]: due to the integration of the system, the reception of mail of large users (*“billing” type*) and physical entities (*“mailing” type*) via integrated electronic access channels is simplified, they offer an option of different ways of data or mail processing and storage, there is a significant **cost reduction** in planning, designing, development, exploitation, maintenance and management of universal electronic access channels and sections of the information system (*subsystem for supervision and subsystem for collection*). Due to the implementation of integrated electronic access channels (*the Internet, self-service devices and contact centre*) of the REM and HM systems, the cost optimization model implemented on the scope of services provided by the PE of PTT communications “Srbija” in the five-year period and based on the 2010 data, produces such **economic effects** that result in cost reductions in the business of this public postal operator ranging from 15% to 40%.

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