

PARTICULARITIES RELATED TO ELECTRONIC SIGNATURES

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Abstract: It is obvious that the technological advance led to a radical change not only of the concept of money, but also of the contracts and agreement that can be done between the parties through electronic means of communication. Digital signature is a technology that allows its users to validate the authenticity of electronic documents or instruments. In this paper we aim to create an overview of the electronic signature, starting from its definition, continuing with the main features and advantages generated by its use, as well as an overview of the legal framework for electronic signatures. The last part of the paper focuses on the process of introducing the concept of electronic signature in the Romanian banking system and presents the main legislative and financial barriers that this process has encountered.

JEL classification: G21, K20, O31

Key words: electronic signatures, banking system, legislative framework, commercial banks

1. INTRODUCTION

The introduction of electronic signatures transformed the way in which companies operate, in that the problem of the manual signing of documents was largely eliminated, which led to a significant acceleration in the signing and approval of documents.

The electronic signature guarantees the authenticity of a document or message transmitted in a digital conversation and uses encryption techniques to provide proof of the originality of the documents. They are used in electronic commerce, software distribution, financial transactions and other situations that are based on fraudulent or tampering techniques.

Further, we present the main features of an electronic signature as well as the main types of electronic signatures, in terms of complexity and the effects produced at a legal level. The first part of the paper will highlight the main advantages of the electronic signature compared to the handwritten signature. The second section of the paper addresses the legislative framework both at the European Union level and at the Romanian level. The last part of the paper presents the particularities of using a

electronic signature in the Romanian banking system. Although the steps regarding the legal framework of the electronic signature were started and implemented in Romania without delay, their use in the banking system was only accepted at the beginning of 2018. In the final section of the paper are presented the main financial and legislative barriers which the introduction of the electronic signature in the banking system has encountered.

2. DEFINITIONS AND FUNCTIONALITIES

Electronic signature is a legally valid way to sign documents in the digital environment. The use of a digital certificate which demonstrates the identity of the signatory and the authenticity of the signature allows the validation of any document in the same way as the notarial authentication. The mechanism behind the digital signature is based on encryption methods that create a unique signature for each user. In this way, the electronic signature assured the securing of documents in the virtual environment, guaranteeing their authenticity, integrity and non-repudiation (Karanikolas, 2019).

Offers, contracts, empowerments, invoices and many other documents can be signed anytime, anywhere, as long as there is internet access and an electronic device such as a computer, phone or tablet. Generally, the digital certificate represents the identity of the person or entity in the digital environment and it is purchased from a company advised to provide such certificates (Perry, 2018).

At present, there are three types of electronic signatures that can be classified according to their complexity and legal effects:

- a) simple or basic electronic signature: data that can be used to identify the signatory (authenticity);
- b) advanced electronic signature: a signature that is linked to the one who signs in a unique, identifiable way, it is created using controlled resources and is linked to the data to which it refers in a way that allows the detection of subsequent changes;
- c) certified or qualified electronic signature: a type of advanced electronic signature that is based on a certificate created by a secure signing device. This type of signature satisfies the legal requirements for signing electronic documents, just like handwriting for paper documents.

Under current European law, simple and advanced electronic signature has legal effects only at the level of domestic law in the member countries, but is accepted as evidence in court proceedings. The qualified electronic signature is the only one that has a legal effect similar to the handwritten signature and is recognized in all member countries (Nistor, 2018).

Regardless of the nature of the technology on which it is based, an electronic signature has to fulfil three main functions:

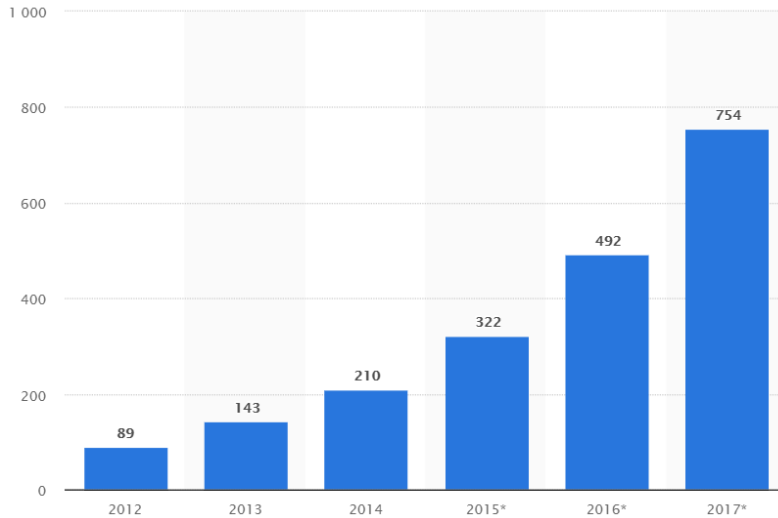
- a) authentication - to guarantee the identity of the signatory;
- b) integrity - to ensure the integrity of the message and that the information contained in the digital document was not changed after it was signed;
- c) non-repudiation - to ensure that the signatory cannot deny the content of the document or the veracity of the signature.

It is very important to keep in mind that this type of signature does not imply the confidentiality of the message.

For companies, the electronic signature has some clear advantages compared to the handwritten signature:

- a) it helps to reduce the time needed for document processing (e.g. no need for an employee to print the document, wait for the client to sign it, scan the document later, etc.);
- b) improves employee productivity by automating basic processes that require repetitive and time-consuming activities that do not contribute substantially to business performance;
- c) reduces costs (e.g. no need to spend money on paper, printers, packaging and shipping);
- d) reduces risks and ensures document secured management (e.g. documents can not be destroyed by mistake or due to internal or external factors, documents can be encrypted and their trail is easy to track);
- e) increases customer satisfaction because it offers a more convenient way to interact with company employees.

According to experts' estimates, the number of global transactions using electronic signature increased from 89 million in 2012 to 754 million in 2017 (see Figure 1). Moreover, the global digital signature market is worth \$ 662.4 million in 2016 and experts expect an annual average growth rate of over 30%, which means that in 2022 this market will be worth \$ 3209.4 million (Reuters, 2017). The two-digit increase per year is largely due to the growing need for e-security, government-backed support, the adoption of advanced technologies in developing countries such as India, China and Brazil, and the growth of e-commerce and internet access and mobile devices among the population (P & S Intelligence, 2017).



Source: Statista, 2019

Figure no. 1 Annual number of transactions based on electronic signatures worldwide

Encryption key-based solutions are the most-developed market segment, while passwords, voice signatures, click-wrap signatures, and signature pads represent the least developed segments of the electronic signature market. From a geographic point of view, the largest market for electronic signatures is represented by North America, while the Asia Pacific region is the area with the fastest growing market. Given that the

electronics vendor industry is still in an emerging phase and that no dominant technology has emerged, it is understandable why competition between suppliers is only at an average level and why they are investing substantial amounts in research and development. (P & S Intelligence, 2017).

Many of these transactions are carried out in the banking system, one of the main systems that have rapidly adopted the electronic signature and has started to use it both in customer interactions and in internal processes (see Table 1).

Table no. 1 Banking processes using the electronic signature

Field	Solutions	Channels				
		branches	online	mobile	agents	kiosks
Daily banking operations	Enrolling new customers					
	Opening accounts (new or existing clients)					
	Account management	X	X	X		X
	deposits					
	Pre-authorized debits					
	Requests for credit or debit cards					
	Boxes of values					
Loans to individuals and SMEs	Requests for credits or leases					
	contracts	X	X	X		
	Notes					
	Receipt					
Asset Management	Mutual funds					
	investment	X	X	X	X	
	Your annuity					
	State titles					
Residential mortgages	Request mortgage loan					
	Mortgage pre-approval	X	X	X	X	
	renewals					
	Secure Receiving Confirmation					
	Enforced execution					
B2B banking services	Open and manage accounts					
	Letter of bank guarantee	X	X	X		
	Bilateral loans					
	Agricultural loans					
	Leases					
Electronic	contracts		X			

contracts	Working specifications					
	Confidentiality contracts					
Internal processes	Procedures in the human resources department					
	Procedures in the Legal Department					
	Ad-hoc processes					

Source: Silanis Technology (2015)

3. THE LEGISLATIVE FRAMEWORK AT THE EUROPEAN UNION LEVEL AND ROMANIAN LEVEL

In the European Union, the usage of electronic signature was first legislated by the 1999 European Commission Directive 93 in 1999, which intended to create a legislative space for the use and development of electronic signatures. The Directive established a community legislative framework for electronic signatures defining electronic signature as "electronic data attached to other electronic data or logically associated with them as a way of validating authenticity".

However, it was only in 2014 that Regulation 910 on electronic identification and trust services (eIDAS) entered into force in 2016 and introduced substantial changes to electronic signatures, electronic certificates and electronic seals. Trusted services cover the entire range of services related to signatures, document certification and websites, time stamps, receipt confirmations, etc.

The eIDAS regulation is valid for all electronic interactions across the 28 EU Member States but also for transactions between member countries. According to the European Commission's communication, this regulation allows citizens, companies and public entities in the European Union to make electronic transactions in an easy, legal and secure manner. For example, any electronic signature based on certificates issued by accredited vendors will have the same legal and administrative validity as a handwritten signature.

Starting July 1st 2016, the European Union has started implementing new rules on electronic transactions between citizens, companies and public administrations at member country level. The eIDAS Regulation replaces the 1999 Electronic Signature Directive which had not been fully and effectively implemented in all Member States because of different interpretations in each State and that there is insufficient technological infrastructure to enable the use of electronic signature on a large scale.

The main changes introduced by the new regulation concern the validity of electronic signatures which must be recognized by all Member States and have the same legal and administrative effects as a handwritten signature. In addition to e-signature, the eIDAS regulation also covers other elements necessary for the development of e-commerce: the date stamp that allows proofing the existence of the document at a certain date and the fact that it has not been subsequently modified, the electronic seal that allows proof of authenticity of the document, the electronic equivalent of a letter with receipt confirmation and the authenticity certificate for websites.

Unlike Directive 93 of 1999, the eIDAS Regulation is directly applicable in all 28 Member States without the need to transpose the national legal framework. This regulation replaces much of the national laws associated with the 1999 Directive, introducing some key changes (Larrivee, 2016):

- a) eIDAS prevents over-regulation that was caused by the different interpretation of the Directive when transposed into national law of each Member State. For example, for a long time, countries such as France and Germany had e-signature laws favouring public key infrastructure (PKI) technology, but eIDAS also allows other technologies for electronic signature;
- b) eIDAS covers the shortcomings in the Directive regarding the failure to define the obligations to be subject to national supervision for service providers which prevented the use of electronic signatures for cross-border transactions and did not cover the whole range of technologies. Given the significant demand for increased confidence in electronic services, the European Commission has opted for the creation of comprehensive legislation to include other technologies besides electronic signature: electronic seals, electronic documents, web site authentication, electronic receipt confirmation and date stamps;
- c) eIDAS allows new procedures of identification and certificates delivery from accredited providers required to sign certain documents that need to have a particular form of electronic signatures. For example, remote identification by using a videoconference in which an identity document is presented or a photograph of the identity document taken using a mobile phone combined with face photography is now allowed and can replace the physical record. In this way, eIDAS created the legislative framework needed to sign ad-hoc electronic documents based on a certificate issued on request.

Furthermore, eIDAS has clarified the terminology in the field of electronic signatures and has enabled companies to accurately identify the elements of the electronic signature that are relevant to their goals and practices by clarifying the distinctive features for simple electronic signature, advanced electronic signature and qualified electronic signature.

Prior to eIDAS, the legal departments of the banks recommended a separate commitment from customers to use the electronic signature in the event of a credit agreement. This was seen as necessary to minimize the risks and to support the validity of the electronic contract. In some countries like Bulgaria, physical signature was preferable to exist before electronic signing of the credit agreement. In other countries such as Hungary, before signing a credit agreement electronically, it was necessary to sign a handwritten contract of a basic contract by which the client acknowledged the electronically signed documents as valid. With the occurrence of eIDAS, these physically signed contracts are no longer necessary because the electronic signature has the same legal validity as the handwritten signature.

In Romania, the first legalization of the electronic signature took place through Law no. 455 of 2001 on electronic signature. The law sought to implement Directive 93 of 1999 and established the legal status of electronic signatures and electronic documents as well as the conditions for accrediting certificate providers. The law recognizes two forms of electronic signature: a) simple electronic signature and b) advanced/extended electronic signature and designates the Ministry of Communications and Information Society as the authority able to supervise all activities related to

electronic signatures. With the new European regulations, the extended signature was replaced by the notion of a qualified signature recognized as the equivalent of handwritten signature. By Emergency Ordinance no. 41/2016, public authorities and institutions have to accept documents signed with a qualified electronic signature from both legal persons and individuals. For example, it is now possible for the employer to issue an electronic employee certificate to be used to obtain child allowance. The main problem at present is that Law no. 455 of 2001 was neither abrogated nor amended to clarify certain differences between domestic law and European rules on electronic signature (Bucur, 2018).

According to the Register of Certification Services Providers for Electronic Signature published by the Ministry of Communications and Information Society at the end of 2018, there are 6 accredited suppliers in Romania: Trans Sped SRL, Digisign SA, Certsign SA, Alfatrust Certification SA, Calculation Center SA and UM 0296 Bucharest.

4. USE OF ELECTRONIC SIGNATURE IN THE ROMANIAN BANKING SYSTEM

Although the legislative framework for electronic signature was implemented in Romania without delay compared to other European countries, the Romanian banking system was reluctant to adopt the electronic signature and the first banks that introduced the possibility of signing contracts using digital means appeared only at the beginning of 2018.

The main impediment invoked by banks was the high cost of electronic signatures provided by local accredited providers. According to the suppliers' websites, the electronic signature costs about 30-40 Euro per year, a cost considered by the banks in Romania to be too high for the client. The cost is high compared to the situation in other European countries, especially since in countries such as Estonia, the electronic signature is free for individuals (Belciu, Farkas & Birgovan, 2018).

According to representatives of Romanian banks, the cost of electronic signatures cannot be transferred to the client, as this would reduce access to banking services and increase financial exclusion (Osman, 2018). This is a significant national problem if we take into account that in Romania only 58% of adults have a bank account and most Romanians in the poor segments of the population do not have access to any form of banking services (Demirguc-Kunt et al., 2017). Moreover, banks cannot afford to bear this cost for customers with small annual turnover (Osman, 2018).

In addition to financial barriers, the implementation of the electronic signature was also delayed by the fact that the legislation in force is not fully harmonized with the European legislative framework. Belciu et al. (2018) claim that at least two amendments to Law no. 445 of 2001 on electronic signature would be necessary: a) introducing an amendment on the measures necessary to implement EU Regulation 910/2014 to facilitate the use of advanced electronic signature systems; and b) an amendment to closed-access electronic signature providers based on an authorization issued by the Ministry of Economy or the Ministry of Communications and Information Society to enable them to operate in a similar way as suppliers of remote payment instruments (i.e. OUG 113/2009).

Moreover, even if the free movement of services in the European Union allows, at least theoretically, the conclusion of partnerships between banks in the Romanian market with providers of electronic signatures accredited in other EU countries,

Romanian legislation makes these cross-border partnerships difficult for banks to reduce costs by stipulating that providers of electronic signatures must have a license from the Ministry of Communications and Information Society (Osman, 2018).

However, two of the Romanian banks considered that they could take the risk of having to prove the validity of credit agreements in court if the clients decided to reject them by invoking the fact that the electronic signature does not comply with the Romanian legislation and have signed contracts with suppliers of electronic signatures in Italy (BCR with Namiral and ING Romani with InfoCert).

Currently, there are several banks in the Romanian banking system that allow the use of the electronic signature: Libra Bank, UniCredit, ING Bank, Raiffeisen Bank and BCR. Other banks have announced their intention to speed up the digitization process.

Libra Bank was the first bank in Romania to introduce the possibility of obtaining credit only through electronic means in 2017. In September 2017, ING Bank launched the first consumer loan available entirely through electronic means of communication. In order to obtain a credit, the client must apply for a digital certificate that is offered on the spot by InfoCERT SPA in Italy. ING Bank chose to fully bear the cost of electronic signature and to offer its customers valid digital certificates for a period of 3 years, while the other banks offer certificates that are valid for several minutes. According to the bank's representatives, this is a strategic decision because it allows the bank's current clients to access other types of products in that 3-year period through the Home Bank platform and because it allows the bank to take advantage of the fact that non-clients were most likely identified by another bank and now they can enrol without having to use costly identification methods such as video conferencing or facial recognition (Enache, 2017).

In May 2018, UniCredit joined the Romanian banks that adopted the electronic signature in customer relations, giving them the opportunity to sign contracts electronically for several types of services addressed to individuals: current account contracts, consumer loans and credit cards. Customers can access their contract documents via mobile and online banking and sign a Qualified Electronic Signature Certificate issued by Trans Sped SRL with which UniCredit Bank and UniCredit Consumer Financing have signed a collaboration agreement through which they can act as registration authorities in the name of the accredited supplier.

Also, at the end of 2018, BCR launched the George digital banking platform, which aims to substantially change the way customers interact with the bank. Unlike UniCredit and ING Bank, which offer the possibility of using the electronic signature only to customers who already had a first contact with the bank in person, George platform allows the opening of a remote account. To open an account through the George platform, a person needs to fill in some personal data, scan their identity card and take a picture with their mobile phone. The facial recognition system confirms the person's identity by comparing the picture taken with that in the identity card. The contract is signed via a qualified electronic certificate automatically offered by the bank. Currently, the platform offers only the possibility of opening an account and ordering a credit card, but in the next period, BCR aims to expand the range of services available entirely through electronic means of communication.

Raiffeisen Bank introduced the first fully available online credit in 2019. Bank customers can get a Flexicredit in about 10 minutes after logging on to

www.raiffeisen.ro, completing a form with personal details and credit information, choosing the right offer and signing the contract using a qualified electronic signature. Joining the fully electronic credit market so late is surprising in the case of Raiffeisen Bank if we consider that this was the first bank in Romania that received authorization from the National Bank of Romania for the use of the electronic signature in 2005.

5. CONCLUSIONS

It is obvious that the technological advance led to a radical change not only of the concept of money, but also of the contracts and agreements that can be made between the parties through electronic means of communication.

In the near future, cash will stop playing an important role. Most of the developed economies are already preparing to move to a cashless economy. This is possible due to the increase in the volume of financial transactions concluded by electronic means and the emergence of new technologies that improve the characteristics of electronic money.

It is obvious that central banks are preparing to introduce their own electronic money and that they will most likely lead to the disappearance of coins and banknotes in the economy. On the other hand, it is equally obvious that part of the population will still prefer cash and that a sudden switch to electronic money would lead to the financial exclusion of the population from areas where there is no internet access.

Moreover, although they are easier to use and safer, electronic money introduces new risks to the banking system because they are exposed to the risk of cyber-attacks and other problems that may arise in the functioning of electronic systems. However, experts believe that the economy as a whole would be safer and that electronic transactions would be carried out under much more secure conditions than cash-based transactions and the disappearance of physical money is seen as certain in most developed countries in the next 10-20 years.

REFERENCES

1. Bucur, T. The legal effects of the electronic signature in the context of the adoption of Regulation (EU) 910/2014 , 2018, www.ccj.ro/effects-electric-electronics-in-context-adoptarii-regulamentului-un-910-2014-consilier-juridic-andra-teodora-bucur
2. Demirguc-Kunt, A. , et. al. The global Findex database 2017 - Measuring financial inclusion and the Fintech revolution , World Bank, 2017
3. Karanikolas, NA Digital signature law in various jurisdictions: legal issues , International Hellenic University , 2019
4. Larrivee, B. E-signatures in Europe: Understanding the legal requirements for proof of intent , 2016, www.project-consult.de/files/AIIM_eSignatures_2016.pdf
5. Osman, O. Opening of the first bank account without any travel to the agency, possible for the first time in November, and in Romania , 2018, www.profit.ro/povesti-cu-profit/financiar/deschiderea-primului-cont-bancar-niciun-drum-agentie Possibly, first-November romania-bcr-can-start-100 online-customer-relationship-platform-george-supplier [Possibly, first-November romania-bcr-can-start-100 online-customer-relationship-platform-george-supplier](http://www.profit.ro/povesti-cu-profit/financiar/deschiderea-primului-cont-bancar-niciun-drum-agentie) [electronic-signatures-all-italy-18,616,684](http://www.profit.ro/povesti-cu-profit/financiar/deschiderea-primului-cont-bancar-niciun-drum-agentie)
6. Perry, T. Electronic Signatures: A guide for lawyers , 2018,

- www.insight.thomsonreuters.com.au/posts/electronic-signatures-guide
7. Reuters Digital signature market size, share, report, analysis, trends & forecasts to 2022 , 2017 , <https://www.reuters.com/brandfeatures/venture-capital/article?id=5640>
 8. Spulbăr, C., Birău, R., "Emerging Research on Monetary Policy, Banking, and Financial Markets", IGI Global USA, 2019
 9. Spulbăr, C., Birău, R., "Financial Technology and Disruptive Innovation in ASEAN", Chapter "The effects of cybercrime on the banking sector in ASEAN", IGI Global, USA, 2019
 10. Spulbăr, C., Birău, R., „CFO's Guide to the Romanian Banking System”, Business Expert Press, Expert Insights, 2019
 11. Spulbăr, C., Nițoi, M., Comparative analysis of banking systems. Sitech, Craiova, 20