A Study Looking the Electronic Payment Market

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The aim of this paper is to make an analysis of the electronic payment market. We identified the most important characteristics of the electronic payment systems especially those mentioned by the European Central Bank. We used for this the companies' websites, the Weka software and the k-means algorithm for data clustering.
Keywords: *e-payment, k-means, Weka.*

I Introduction

Nowadays, in the electronic payment market, people make different payments using many different devices. The concept that is used for such devices is **electronic channels** [Milutinovic,2003]. This are: fax, Internet, call center, digital television, ATM, POS, cards (clasic plastic card, chip card, card with antenna), e-mail, Internet, wireless devices (mobil phone, tablet PC, PDA, smartphone).
In addition to this, inside an electronic payment system there are many complex financial circuits. A financial circuit is the way the digital money arrives from the payer to the payee, using intermediaries like banks, financial institutions, payment organizations, payment servers' owners and private companies. Besides, there are many payment instruments for issuing and storing e-money and different procedures to make the transactions settlement.

II. The Characteristics of the Elecrtonic Payment Systems

A successful electronic payment system should be one that satisfies all parties implied in a transaction. As the payment services are promoted using different electronic channels and they are based on different procedures and financial circuits, we could make a synthesis of the requirements that such a system must have: [Poenar,2006]
Acceptability: All parties implied in a transaction (payer, payee, financial institutions, private companies that own payment servers, recently mobile network operators) should agree the payment system.
Security: The system must have implemented security systems at the device level (special materials and signs, cards that uniquely identifies the user) and at the soft level (cryptographic and authentication algorithms). It must also be complied to the government legislative constrains and to an international standard. In addition, all the transactions must be auditable (registered in the accounting system).
Cost: The transaction cost should be a very low one and also not to depend on the value of the transaction, but on the number of transactions being made. Eliminating intermediaries and realizing direct funds transfer between the parties (e.g. peer-to-peer) should substantially reduce the cost.
Anonymity: Researches have been made show that customers using the electronic payment systems, especially the ones making purchases, want to stay anonymous. This will be practically impossible if a banking or non-banking account exists. By having an account with a bank or company customers give access to them to all information about the history transaction. The impediment of an anonymous payment system is that it isn't a standard-based one and a non-auditing, too.
Universality: The system must offer the possibility to realize all types of transactions – **P2P** (*Person to Person*), **B2B** (*Business to Business*), **B2C** (*Business to Customer*), **P2G** (*Person to Government*), **B2G** (*Business to Government*), with domestic, regional and in-

ternational coverage, low-value and high-value payment and currency conversion.

Usability: The system must have a user-friendly interface and the learning curve must be close to zero. The customer must have the possibility to personalize the payment service to integrate every day activities and financial needs into.

Interoperability: The system should be combined with other payment systems, no matter of the device being used or financial circuit.

Attractive: The payment system should have loyalty applications implemented through which customers should get benefits (decreasing the bill value, getting rewards such as goods or some other additional services) out of using a specific payment system regularly. Loyalty applications are based on loyalty points, which can be converted into the above benefits.

Speed: Transaction clearing/settlement must be rapidly made, in real time, so customers know exactly their available funds at any time.

III. A Study Looking the E-Payment Market

We will present a study looking the E-payment market. As we mentioned above we have taked into consideration 33 electronic payment systems (EPS), especially those that are mentioned by Europen Central Bank in [ECB,2004] and Ricarda Weber in [Weber,2000]. For each of these systems we have identified if the system possess an attribute, doesn't possess or we couldn't identify information about the attribute. We have used only the informations existing on the sites of the companies that promote these systems. We used the Weka software and the k-means algoritm with k=2 (k=number of clusters) to study the 33 electronic payment systems. We didn't obtain significant results for k>2.

Table 1. *EPS and their web site address*

EPS	Web site address
Bibit	http://www.bibit.com/
Bitpass	http://www.bitpass.com
Chipknip	http://www.chipknip.nl
Chinapay	http://www.chinapay.com/
Click&Buy	http://www.btclickandbuy.com/
Crandy	http://www.crandy.com/homepage/us/home/home.jsp
CyberCoin	http://www.businesstown.com/internet/ecomm-solutions.asp
ECash	http://www.businesstown.com/internet/ecomm-solutions.asp
Echeck	http://www.echeck.org/overview/what.html
ePayment	http://www.epayment.ro/plata_online
First Virtual	http://www.virtualschool.edu/mon/ElectronicProperty/klamond/Fvpymnt.htm
GeldKarte	http://www.geldkarte.de/_www/en/pub/geldkarte/geldkarte_users.php
Isabel	http://www.isabel.be/gps/en/index.php
INIpay	http://www.inicis.com/english/index.jsp
Mondex	http://www.mondex.com/
MoneyBookers	http://en.wikipedia.org/wiki/Moneybookers
mpay24	http://www.mpay24.com/
NetBill	http://www.ecom.tifr.res.in/ecom/netbill.html
NetCash	http://www.netcheque.org/netcash/
NetCheque	http://www.netcheque.org/
Nordea Solo	http://www.nordea.fi/sitemod/default/portal.aspx?pid=760000
Ogone	http://www.ogone.com
PayMe	http://www.w3.org/Conferences/WWW4/Papers/228/
PayPal	http://www.paypal.com/
PaySafeCard	http://www.paysafecard.com/
Peppercoin	http://www.peppercoin.com/

Proton	http://www.epci.be/proton.htm
SplashPlastic	http://www.360money.com/splashplastic/
T-Pay	http://www.t-pay.de/t-pay/
VeriFone	http://www.verifone.com/index.cfm
Visa	http://corporate.visa.com/
Wallie	http://www.wallie.com/newsite/nl/
Way2Pay	http://www.way2pay.nl/

Table 2. *The main attribute of the EPS*

Acceptability	*a*
Anonimity	*b*
Atractivity	*c*
Cost	*d*
Useability	*e*
Interoperability	*f*
Speed	*g*
Security	*h*
Universality	*i*

We have used the following notations:
1 – the system has the atribute
2 – the system hasn't the atribute
3 – we could't identify informations

We have centralized the informations and we have obtained the following results:

EPS	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
Bibit	*1*	*2*	*2*	*1*	*1*	*1*	*1*	*1*	*1*
Bitpass	*2*	*2*	*1*	*1*	*2*	*1*	*3*	*3*	*2*
Chipknip	*2*	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
Chinapay	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Click&Buy	*2*	*2*	*1*	*3*	*1*	*2*	*3*	*3*	*1*
Crandy	*1*	*1*	*1*	*3*	*1*	*1*	*3*	*3*	*2*
CyberCoin	*2*	*2*	*2*	*3*	*2*	*2*	*3*	*1*	*2*
ECash	*1*	*1*	*1*	*3*	*2*	*1*	*3*	*3*	*1*
Echeck	1	*2*	*2*	*3*	*1*	*1*	*3*	*1*	*1*
ePayment	2	*2*	*2*	*3*	*2*	*1*	*1*	*1*	*1*
First Virtual	2	*1*	*2*	*3*	*1*	*2*	*2*	*1*	*2*
GeldKarte	1	*1*	*1*	*3*	*1*	*2*	*3*	*3*	*2*
Isabel	2	*2*	*2*	*3*	*1*	*2*	*3*	*3*	*1*
INIpay	1	*2*	*1*	*3*	*1*	*1*	*1*	*1*	*1*
Mondex	2	*1*	*2*	*3*	*1*	*1*	*3*	*3*	*1*
MoneyBookers	2	*2*	*2*	*3*	*2*	*2*	*2*	*3*	*2*
mpay24	1	*2*	*2*	*3*	*1*	*1*	*1*	*1*	*2*
NetBill	2	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
NetCash	2	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
NetCheque	1	*2*	*2*	*3*	*1*	*2*	*3*	*3*	*1*
Nordea Solo	1	*2*	*2*	*3*	*2*	*2*	*3*	*3*	*1*
Ogone	2	*2*	*2*	*3*	*1*	*1*	*3*	*3*	*2*
PayMe	1	*2*	*2*	*3*	*2*	*2*	*3*	*1*	*2*
PayPal	1	*2*	*1*	*3*	*1*	*1*	*3*	*3*	*1*
PaySafeCard	1	*1*	*1*	*3*	*1*	*1*	*3*	*3*	*1*
Peppercoin	1	*2*	*1*	*3*	*1*	*1*	*3*	*3*	*2*
Proton	2	*2*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
SplashPlastic	2	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*2*
T2Pay	2	*1*	*2*	*3*	*1*	*2*	*3*	*3*	*1*
VeriFone	1	*2*	*1*	*3*	*2*	*2*	*3*	*3*	*1*
Visa	1	*2*	*1*	*1*	*2*	*2*	*3*	*3*	*1*
Wallie	2	*1*	*2*	*3*	*2*	*2*	*3*	*3*	*1*
Way2Pay	1	*2*	*2*	*3*	*2*	*2*	*3*	*1*	*2*

Using the Weka software we obtained the following results: 6 (18%) from the EPS possess the attributes and 27 (82%) doesn't possess the attribute.

Cluster 0

Acceptability	1.3333333333333333
Anonimity	1.8333333333333333
Atractivity	1.8333333333333333
Cost	2.6666666666666665
Useability	1.1666666666666667
Interoperability	1.1666666666666667
Speed	1.5
Security	1.0
Universality	1.3333333333333333

Cluster 1

Acceptability	1.5925925925925926
Anonimity	1.6296296296296295
Atractivity	1.6666666666666667
Cost	2.8518518518518516
Useability	1.6296296296296295
Interoperability	1.7407407407407407
Speed	2.962962962962963
Security	2.7777777777777777
Universality	1.5925925925925926

These results mean that the web sites don't present enough information about their electronic payment systems. They don't refer to the cost (2.85), the security (2.77) and the speed (2.96), as we can see in cluster 1. The systems don't have the following attributes: interoperability (1.74), useability (1.62), anonymity (1.62), universality (1.59). Only 6 of 33 systems have the attributes mentioned above, in cluster 0: security (1.0), speed (1.5), interoperability (1.16), useability (1.16), acceptability (1.33) and universality (1.33).

IV. Conclusions

The electronic payment market suffers profound modifications because of the technological development. Everyday new devices and financial circuits are promoted worldwide. They are rapidly integrated in the electronic payment area.

An ideal electronic payment should be one which possesses all the attributes mentioned above. Most of the electronic payment systems don't have these attributes mentioned on the websites.

In our future studies we want to determine if the electronic payment systems presented on the web sites satisfy the requirements for the payer and payee, in the statistical study made by the European Central Bank. [ECBa,2006]

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