

**HOCHSCHULE FURTWANGEN UNIVERSITY**

**MICROMONEY  
(Electronic Currency)**

**e-BUSSINES TECHNOLOGIES**

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**Declaration**

The present work of research was done by Luis Enrique Heredia Figueroa. The information was taken for several sources, and in the present documentation, everything was cited and in order to follow the documentation rules with respect to that, the sources are listed in the part mentioned.

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# 1. Introduction

## 1.1 The Definition: Concept and Application

What to use in order to define the concept of electronic money? In my



personal research I found even the challenging question that if Electronic Money is really different from the common currency. Maybe for the limits of this research work, it is enough to explain the technical definition and give some examples. But even if this was enough for a research work, it is important to make it clear, defining it with the basic concept to really show the impact and the importance of it, and maybe with this, understand and predict the possible future and consequences that with this could surely come.

To start this task, it is necessary to explain the concept and show it like that. In this way, we could define the Electronic Money system, or Electronic Currency (Micromoney) as a system to exchange money electronically involving for this communication systems such as computer networks, internet and digital stored values. The value of this money is supported in different currency values. Since the commonly known credit or debit card that has the quantity of money that the customer decide or deposit and that it is used to make several kind of payments, till the transportation card system in some places of Europe and Asia, used just for this purpose.

It is important to mention that, electronic money is generally known in two forms, that which is card-based and that which is software-based. The expectations of the present research are to define them and to focus on the direct and actual applications.

## **2. Electronic Money**

### **2.1 Forms and Generalities**

To speak about electronic money and the use of it, we need to take in consideration the two general forms in which it appears and define them.

#### ***2.1.1 Card Based System***

As the name explains, it is based on smart cards. It is maybe for our daily life one common form of payment. These smart cards are generally defined as a portable data storage device with intelligence (chip memory) and provisions for identity and security. The origins of this payment system are not as new as most of the people could think. Since the 1970's we found the starting intentions to

generate a different and safer form of payment. The use of technology like microprocessors and small devices of memory storage, helped for the first steps to be done.

From the central documentation used for this research work, there is one brief explanation in time of how the idea evolved from its origin.

- 1970 – Was the year for the first implementation of microelectronic devices in plastic substrate by the Japanese Kunitaka Arimura. In this first implementation, the patent was directed to the technological aspect. The potential functional features of this system were not taken into account for this starting point and patent.
- 1974 - First patent focused on the functional features, such as the use of secret words (PINs) for the information access permission. It was called “An independent electronic object with memory” and the developer was the French Roland Moreno.
- 1979 – The first smart card is developed by the technology developers from Honeywell Bull.
- 1980 – It was the real beginning with the first trials in France, the country with the patent at the moment. The French Bank Card Association collaborated with the Blue Card (related this to Visa), the Green Card (related to MasterCard) and the TA (The French phone company administrator) to generate an hybrid model that contained a chip and a magnetic stripe. Later, there was also an application for Universities in France, to manage the services in general.

To support the value, a private currency may use gold to provide extra security, for example in the case of digital gold currency. In the case of private organizations, we also can speak about some personal methods. One clear example is the Eagle Cash, a card use by the US Army that works as a debit card but for the use of this sector in order for them to stop the use of cash in service time.

Inside this card based system, we found also two main forms that are used and in which it divides the system. The two general forms are:

- Closed System
- Open System

But what is the difference?

## *Smart Card Open System*

The main point is that, it is possible to use the value or currency on the card in the same manner as any other type or method of payment in the specific place. This is, it is not focused or intended to use the card just for one certain transaction or to buy one certain product or make one specific transaction. The name open, explain the possibility, and limited just by the use of electronic terminals to validate this type of payment, the open system is closer to cash currency type.

Maybe the biggest problem of this open system is the limitation derived from the necessity of having a terminal in order to validate payments. This is maybe not a problem for big commercial companies, but in small enterprises or stores, is in some way difficult to adapt the process and to pay the inversion.

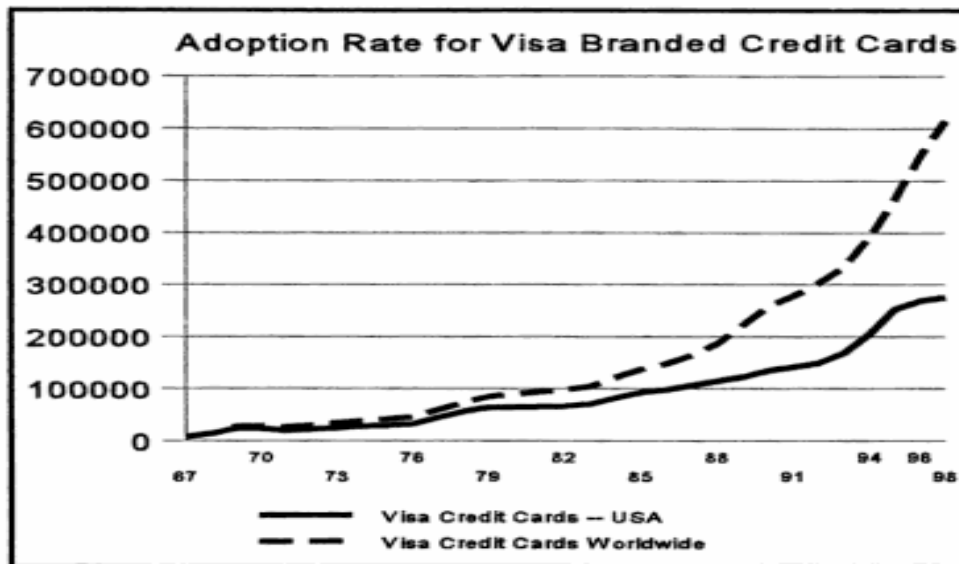
For this, we need to speak about the different options to complete this kind of transactions. Since the first trials of these systems, it was necessary to have in mind two different possibilities: An unaccounted Electronic Money Model, and an Accounted Electronic Money Model.

**The Unaccounted Electronic Money Model:** It is used for transactions of all type. The aim is to be closer to the cash transactions. In some way, it is intended to provide universal cash replacement and base everything in this card based system. One of the weak points of this unaccounted model, is the impossibility to have a full audit trail of the transactions and without that, it is not possible to save information about the movements.

The clearest example of a current application is the implemented Mondex Card. This, part of the MasterCard suite of smart card products, enables cardholders to carry, store and spend cash value using a payment card. It is faster than handling conventional currency, and as we have been discussing in the report, it is supposed to be in many cases safer. It does not require signature, PIN or transaction authorization and the most important part, is that the platform allows its use in Internet, mobile phones and interactive television, where cash cannot be used.

**The Accounted Electronic Money Model:** In this case, we do have an audit trail. Since the early years of this current century, this idea has been maybe the more used. With this system, it is possible to have a strong control on the transaction process, since the possibility that it offers of archiving functions. It is, anyway, lacking of the anonymity of incorporate it into the web browsers and taking in consideration the growth that the business through internet had, it is maybe one great disadvantage.

Generally speaking, in the recent years the tendency of growing from consumption of the credit cards had continued. It is shown in the next graphic, taken from the book *The Changing Face of Money*, from Barbara Ann Good.



Adoption Rate for Credit Cards (Visa International; data are estimated for 1967–1974)

*Smart Cards Closed System*

In this closed system, the main change is that the stored-value card could only be used for one purpose or only in one determined environment. This could be in closed circuits of universities such as the card that we used in the Hochschule to pay the food or to pay library issues. Even knowing that this is a limited system, it is wide the application field nowadays.

One of the first big applications was the card for transportation system payments in some parts of Asia, more exactly in Hong Kong and Singapore. The people were able to pay the transportation services through this way, and of course one of the benefits was the quicker response and from this, better service. It was not necessary to stop and change the currency received from part of the drivers, or to count or detect some false currency objects, so everything was more efficient.

The current application is now used in Hong Kong.

- Octopus Card

The system work without contact and it is possible to charge the stored value of the smart card in the same way. The principal objective, as it is

mentioned above, is for the mass transit system in Hong Kong. Anyway, the use of this card had a lot of success.

In recent years, this card had an additional feature. It is known that after the explosion of this possibility, nowadays it is accepted in stores, supermarkets, parking meters, vending machines, etc. Anyway, it cannot be considered as an open system, because it is valid just in Hong Kong, and this limit is enough to take it out of the open system group.

### *2.1.2 Off-Line Electronic Money*

Some of the disadvantages of managing cash, is that we need to spend time in to administrating, paying and the merchant into check it and validate and counting it. In the case of the off-line electronic money systems, we don't use nothing but the electronic machine to validate and the time is no longer than seconds to pass the card over the reader until it registries the charge and after that, in an offline way, later the merchant has the opportunity to check and validate it, knowing that also, if there's some problems, it could be handle by the lector and of course, by the bank and authorities.

The development of cryptography is basic in this area. The usage of blind signatures is the basis of using this kind of electronic money. The system has been proved and it is known that it is enough safe and that, even though it is necessary for the merchant to wait and prove all the transactions at the end of them, the cryptography and terminal systems had produced good results.

## 2.2 Alternative Systems

Although we have been talking about directly about the applications that we have nowadays, there's alternative systems to the electronic currency. If we speak about, technically, this digital money or digital currency is a representation, or a system of debits and credits that is used to exchange value, within another system, in the online or offline form.

### *2.2.1 Software Based Systems*

The main channel for these systems is Internet. To manage these networks in the safest form is the principal aim. For the purpose, it exists a large lists of providers and schemes devised to make purchases secure over the internet. Of

course, talking about this software based systems, one of the principal concerns is the security, mainly because we are dealing with merchants and consumers that between them don't have any other kind of contact but the internet data (that most of the time is not 100% confident).

The business runs through an open network (internet) and it lacks of standards to regulate completely the process. Of course, there have been a lot of efforts to develop a real secure industry standard, in order to confirm the security of the information traveling on this open network. In this work, MasterCard and Visa, agreed to develop the SET (Secure Electronic Transactions) standard since 1996 in order for them to address consumer concerns. The standard spoke mostly about integrity of transmitted data, authentication methods, creation of protocols and the confidentiality of payment information and to enable confidentiality of order information transmitted along with the same one. Anyway, nowadays, it is not fully operating.

Some examples of the software based systems are:

**Digital Gold Currency:** That supports the stored value on gold, a strong currency to do this and of course offers good stability.

**Paypal:** Famous through the net, it is mostly like an interface between the merchant and the consumer. It allows the consumer to buy the stored value that then he will use it to make the payments over the Internet.

**Liberty Reserve:** Not so wide known payment processor and money transfer system. Also, works as an electronic wallet and interface between the consumer and the merchant. It offers new and innovative features.

## **3. Conclusions**

### **3.1 Influence**

With this, it is possible to notice, that the electronic money transactions in all of its forms it is growing with the initial tendency. Even knowing this, the electronic money systems had advantages and disadvantages that had been a factor through all the development of the technology and platforms, to maintain this currency system in the levels that it works. The General issues about that are:

*Advantages:*

- Convenience
- Privacy
- Increased efficiency of transactions
- Lower transaction fees
- New business opportunities

*Disadvantages:*

- How to levy taxes (Lack of Standards for general regulation)
- Possible facility of money laundering
- Exchange rate instabilities
- Shortage of money supplies

### 3.2 Approaches

At the end, it is necessary to search the more suitable cyberspace and microprocessor use regulations or laws that manage the transactions and watch for signs of trouble to help this new concept that seems to be the next step in business development, generally speaking.

It is by means of this new system, that the economy concept and processes could suffer a great change, because we haven't consider the laundry money problems that could come with this electronic systems (as the hackers in internet) because anyway, everything is based in this networks. At the end, maybe the electronic currency will be over the normal currency and the financial effects could be handle of course by the consumers and merchants, but a new way of bussines and economics, without a doubt, would come with it.

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[http://en.wikipedia.org/wiki/Electronic\\_funds\\_transfer](http://en.wikipedia.org/wiki/Electronic_funds_transfer)