RESEARCH ARTICLE                                                                         OPEN ACCESS

# E-Commerce: Study, Development and Prototyping

Ing. María Lucía Rodríguez[1], Ing. M.Sc. Eustaquio Alcides Martínez Jara[2]
Polytechnic School – U.N.E.[12]
Ciudad del Este, Paraguay[12]

**ABSTRACT**
This project was a study of the development of an electronic commerce in Paraguay, tracking laws and regulatory decrees formulated by the technical agencies. As a result, a prototype is developed, which reproduces the steps to follow in a web-based e-commerce transaction using fictitious credit cards as payment method. A particular digital certificate created for testing purposes was used, performing secure connection via https protocol and the digital certificate issued by the Enforcement Authority and the Ministry of Industry and Trade. The results were obtained through the measurement of the database log, matching planned rules for transactions with the results obtained.
**Keywords**: e-commerce, prototype, digital certificate, Enforcement Authority, laws.

## I.    INTRODUCTION

Communication and computing technologies bring people and entrepreneurs to new frontiers, creating a need to adapt to ensure its permanence in the market, but at the same time it brings the benefit of exceling in the business world. A singular example is e-commerce, with its every day growth and expansion to different areas worldwide.

As with our example, e-commerce is a technology that lets consumers, suppliers of goods and services have access to trade information and conduct transactions in a simple and inexpensive way, but, in addition, requires that stakeholders are provided with security on the transferred information and its effects, not only technological, but also legal.

### 1.1 Issues

The universal use of internet and www multiply the electronic presence of companies and, therefore, the problem arises when using the service with lack of focus and working knowledge of what actually constitutes such activity, where the lack of credibility plays a crucial role, which must be eradicated with the promulgation of more studies about the raid in conducting e-commerce transactions in order to offer continuous training to as many Paraguayans as possible, exceeding limits and looking for anendlessly flowon our emerging economy, surpassing paradigms and taboos to the collective success of the whole nation.

### 1.2 Objectives

#### 1.2.1GeneralObjective

Proposal of aguideofdevelopment and implementation ofe-commerce sitesinParaguay.

#### 1.2.2Specific Objectives

- Investigate the different web e-commerce services.
- Show the different e-commerce technologies and corresponding certification.
- Define the elements of an architecture to design an electronic trading system.
- Create a guideline for the implementation of e-commerce in a company.
- Developing an electronic commerce prototype using free software.

### 1.3. Discussion of relevant literature.

#### 1.3.1. The Electronic Commerce and Consumer Protection in Venezuela.Bastidas Jose Manuel Garcia - Elias Cardona Bermudes [1]

The purpose of this research is to study the growth of electronic commerce, market changes, the parties (buyer and seller and bidder or offeror), the scope of territorial laws, the overcrowded international trade and globalization. Given these changes, the laws, always slower than social phenomena appear gradually to regulate, control and protect citizens, showing how consumers are protected in Venezuela in these avalanches of offers and consumption. The changes modified early centuries and thanks to technology has transformed to the ancestral Roman Law, "The Theory of Obligations".

Concluding that technology is vital in human behavior to the law, they found that all technical studies directed towards to facilitate, improve and

perfect the human activity, are of interest to the Laws. Law and technology go by hand. That is why the methodology used is APA.

1.3.2. Adoption and implementationof electronic commercemedium enterprises inPeru. A case study. PeterYamakawaTsuja- JaimeSeridaNishimura[2]

This paper examinesthe factors associatedwith the adoptionof electronic commerce andthe relationshipbetween these factors andthe degree of implementationof this technology inmedium-sized businessesin Peru.It does so from theempirical evidenceprovided bycompanies representingsuccessful experiences of e-commerce usage. Also,in response tothe need to usea different unit ofmeasure than thebinaryadopted/notadopted toestablish the degree ofimplementation ofe-commerce technology. Thisresearch presents aproposal for the measure, which considers four dimensions:volume, diversity, breadth and depth. The frameworkofanalysis comes fromthe theory ofdiffusion of innovations.

1.3.3Introduction toElectronic Commerce.EspacioPymeS.A.[3]

Introductory textabout e-commerceinSpaindividedinto several sections:The first part consistsofdefinition,statistics, trends, categories; the secondcoversthe existing legislationin the EuropeanUnion andSpain. Then, information aboutthe institutionsthat organize coursesand seminarson this subject.Finallyabouteventsat country level(Spain) andnetwork securityconsideringcertification agenciesand decrees ondigital signature. With this workis acquired a guideto researchagenciescertifications andwhetheror not we have theminParaguay, also the existenceofany legislationon electronic commerce.

1.3.4Implementation of aVirtualPrototypeShopon aLinux-basedplatform forSecure Electronic Commercetransactions. Ing. JorgePatricioBarrosPicon[4].

Thepaper makesan overall studyof e-commerce andits implementationto conduct transactionssecurelythroughan online store, basic elements involvedinan electronicstore forthe development and implementationof a prototype.

## II. 2. ELECTRONIC COMMERCE

There are different concepts about the term e-commerce. Below are listed the most influential:
- According to the World Trade Organization, the term "electronic commerce" is meant to the production, distribution, marketing, sale or delivery of goods and services by electronic means [5].
- Concept by Legislative Branch Law No. 4868: It is all commercial transactions made by suppliers of goods and services electronically and by distance [6].
- In Electronic commerce are involved at least four agents [7]:
- The supplier that offers its products and / or services over the Internet.
- The customer who buys the products and / or services offered by the provider via the Internet.
- The payment method manager, which establishes mechanisms for which the supplier receives the money for their products or services from the client.
- The verification or certification entity, that guarantees by an electronic certificate, that the agents involved in the process are who they say they are.

E-commerce is a legal act with financial content, that is, a contract, with the peculiarity that the communication between the contracting parties: acceptor and bidder occurs electronically [8].

Then, as in all contracts in electronic commerce, two or more subjects are involved, which are divided into: entrepreneur (business), consumers (consumer) and administration (government).

Basically, anelectronic trading systemconsists ofsomewebpages that offera catalog of productsor services.When the customerfinds theproduct it is interested in, fills out aform with itsdata,the selected productand correspondingpayment methodchosen.Activatingthe form, ifthe payment methodchosen wasa credit card, the payment gatewayor virtual POS(Point of Sale) is activated It is a piece of software developed byanyfinancial institutionthat allowsacceptingonline paymentsthroughcredit cards.

At that time a communication that does the following is generated:The customer's bank accepts (or rejects) the operation, the supplier and customer are informed of this and, through banking networks, payment money is transferred from the customer's account to the account of the supplier. From that moment, the supplier will send the item to the customer.

All these operations are usually carried out under what is called a secure server, a computer certificate verification by an entity that uses a special protocol called SSL (Secure Sockets Layer), ensuring the

confidentiality of data between the parties or, more recently, the SET (Secure Electronic Transaction) protocol.

Ecommerce features
- Transaction of goods and / or services.
- Use of electronic means.
- Reducing transaction costs.
- Opening a new market: "The Virtual Market".

## III.    3. ELECTRONIC COMMERCE IN PARAGUAY

In the last three years, the online business grew 222% in Paraguay and the numbersmoving are to pay attention [9]. A monthly amount of US $ 2.478 billion between foreign and local purchases in January 2011, $ 7.7 billion were spent in purchases from Paraguay in 2014, according to Bancard.

Paraguay adopted virtual consumer electronic commerce for local purchases, mainly in the area of traveling, apps, telephony, clothes and food, through the increasingly widespread virtual platforms.

Currently, Bancard has in its ranks 200 shops where electronic commerce transactions can be made in Paraguay, demonstrating the strength of growth in the sector. The average amount of local e-commerce transactions exceeds the 9800 monthly and according to sales volume, reaching the Gs 1.3 billion per month.

Paraguay has great potential in terms of what e-commerce is concerned, with the massification of payment methods and shrinking network access costs, allowing the market and knowledge to diversify. Moreover, the initial mistrust, especially with regard to data security has been giving in gradually, allowing online sales to show a sustained growth.

The legislation regulating the Information Society in Paraguay begins in 2010, with the Digital Signature Law [10]. The step taken in 2013 with the enactment of the Law on Electronic Commerce, is a milestone in the history of Paraguayan laws.

According to the statement by the MIC, the Executive Branch decree approved the Regulation of Law 4868/13 on Electronic Commerce, which has given specific legal support for a transaction method that has long been practiced in our country and worldwide [11].

With this legislation, the activity of purchasing goods and services at a distance and electronically,

which means a direct or indirect benefit to the supplier thereof, must comply with certain rules established in the Law of Electronic Commerce and Decree 1165 / 14.

Currently, among the leading institutions in the region that make the digital economy by promoting businesses online, are [12]:
- Paraguayan Chamber of Electronic Commerce, CAPACE.
- Paraguayan Chamber of Internet, CAPADI
- The Latin American Institute of Electronic Commerce.
- Ministry of Industry and Trade.
- Rediex.
- Paraguayan Industrial Union.
- National Secretariat of Communication and Information (SENATICS).
- COPACO, CONATEL.
- BANCARD, PROCARD.

## IV.    4. METHOD

The proposal for prototype architecture is divided into two sections: shop and provider.

A client-server architecture, where the Store website is hosted on a web server, including database Store, comprises the data of customers, products, transactions, etc. used for the Store architecture. Communication between the parties is done as illustrated in Fig.4.1, where the client connects to the web site, then browse through it to collect items on the shopping cart. Once you confirm the purchase, the site sends the relevant information to another site (the provider), where sent data is verified.



*Figure 4.1 - Architecture of the prototype*

For the architecture of the provider, a client-server structure was also used, with the site hosted on a web server with its own database, separate from the store, constituted by the data of credit cards, stores enabled to use payment systems, etc. The site receives data from the store, then checks the data sent, consisting of: Store Data (to find out whether it is enabled or not), transaction data (amount, client). Once the data is verified by scripts, the provider sends information to the bank if the transaction is possible. The database of the bank in this case, is in conjunction with the provider one. Verified the data,

this information is returned to the provider, which in turn returns a result to the store, which informs the client whether or not the transaction was completed successfully.

The tests are performed through user interaction with the e-commerce website (registration, browsing through the products catalog, order completion, payment and payment gateway response).
All communications between sites (tent, provider, bank) are performed using SSL encryption and certificates.

## V.    5. RESULTS

The results obtained through the counter on the e-commerce website and database log records showed the correct resolution for each of the answers of the transactions, responding and demonstrating the optimal functionality of the online store serving as a prototype for testing and commissioning of a place where you can work with e-commerce.
It did not allow purchases without prior user subscription, and if the user already existed, it could perform operations unhindered, where the margin of difference can be seen in the chart below (Fig. 5.1).

*Figure 5.1 – Site Functionality*
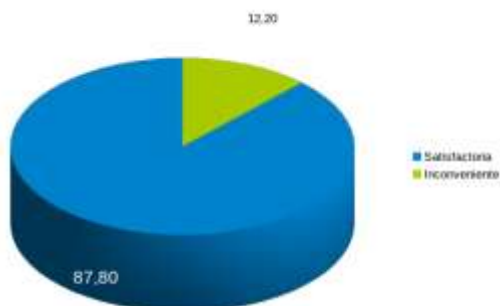


Analysis of the Store Tests

Of the overall transactions, the 87.80% were performed satisfactorily and only 12.20% had any problems, suggesting the effectiveness of the prototype. The site received 283 visits from people, representing a total of 26 users, that conducted a total of 82 transactions, of which 90% were performed satisfactorily and only 10% had any problems (seeFig. 5.2).
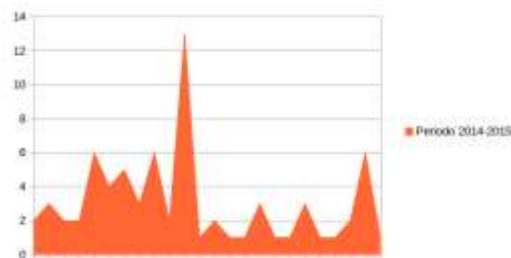


*Figure 5.2 – Store Operations*

The quantities of each of the operations performed (Fig. 5.3) indicates, according to the classification of possible outcomes for transactions.
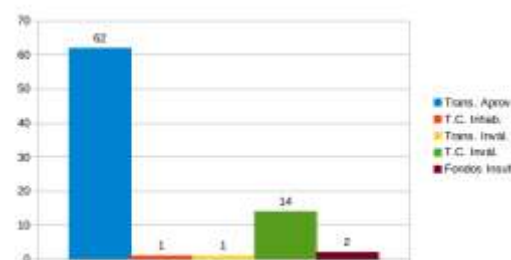


*Figure 5.3 – Performed Operations*
Analysis of the verification tests.

Based on test results of the verification, out of 82 transactions, 62 were performed correctly, 1 had a disabled card, for suspended status in the bank, 1 invalid transaction, for not being registered at the e-commerce site, 14 invalid, for an error with the digitization of card details and 2 had insufficient funds in their credit cards.

## VI.    DISCUSSION

After a thorough investigation, it was found that Paraguay has done its job in terms of legislation and regulation of electronic commerce.The legislative progress that Paraguay has been experiencing from 2010 has bolstered not only the economy, but the very image of a territory. In turn, the low coverage of the strengths of e-commerce runs as a secondary cause of the problem.

Using different free technologies under a client-server architecture, a prototype for conducting electronic transactions took place.It consists of two servers, one for the online store, where you will find the product catalog and customer data; and second, for the payment gateway, which verifies and processes the collection through fictional credit cards.

Tests conducted consisted of electronics store navigation, orders subscription and payment transactions.

With the conducted test, the obtained results were:
• Follow-up to the full adoption of the Electronic

Commerce Law Number 4868/13 of the Paraguayan Republic.
• Using free technologies in the development and implementation of the prototype.
• Layout and coding functionality of a full e-commerce site.
• Creation of a guide to using an online store for electronic commerce.

## REFERENCES

[1] ELCOMERCIO ELECTRÓNICO Y LA PROTECCIÓN AL CONSUMIDOR EN VENEZUELA José Manuel Bastidas García– Elías Cardona Bermúdes. [online] http:// www.urbe.edu/publicaciones/telematica/indice/pdf-vol7-1/4-comercio-electronico-y-proteccion-al-consumidor.pdf

[2] ADOPCIÓN E IMPLEMENTACIÓN DEL COMERCIO ELECTRÓNICO POR EMPRESAS MEDIANAS EN EL PERÚ. Un estudio de casos Peter Yamakawa Tsuja - Jaime Serida Nishimura. [online] http:// www.esan.edu.pe/paginas/pdf/YamakawaSerida.pdf

[3] INTRODUCCIÓN AL COMERCIO ELECTRÓNICO EspacioPYME S.A. [Online] http://www.educastur.princast.es/fp/hola/hola_bus/cursos/curso6/documentos/intro.pdf

[4] IMPLEMENTACION DE UN PROTOTIPO DE TIENDA VIRTUAL SOBRE PLATAFORMA LINUX PARA REALIZAR TRANSACCIONES DE COMERCIO ELECTRONICO SEGURO" Ing. Jorge Patricio Barros Picón. [Online] http://dspace.ucuenca.edu.ec/jspui/bitstream/123456789/2530/1/tm4396.pdf

[5] O.M.C. "O.M.C. Comercio Electrónico: Programa de Estudio". [Online] https://www.wto.org/spanish/tratop_s/ecom_s/wkprog_s.htm

[6] Poder Legislativo. "Poder Legislativo Ley No. 4868". [Online] http://www.acraiz.gov.py/index.php/descargas/finish/3-leyes-a-decretos/12-ley-n-4868-comercio-electronico/0

[7] Wikipedia. "Cámara de comercio". [Online] http://es.wikipedia.org/wiki/C%C3%A1mara_de_comercio

[8] Patricia Nieto Melgarejo. "NOCIONES GENERALES SOBRE EL COMERCIO ELECTRÓNICO". [Online] http://www.derecho.usmp.edu.pe/cedetec/articulos/el_comercio_electronico.pdf

[9] Rosa Elena Di Martino Ortiz and Antonio Villa Berkemeyer. "Comercio electrónico en Paraguay x3". [Online] http://spanish.berke.com.py/noticias-eventos/noticias-eventos_detalles.aspx?p1=ZFdaNnBYOGRVQmgxMXhlcG9FbXAxcHdsYkl2ZGGQzWGIxTGQzVlE3ZWhobz01&tit=Comercio+electronico+en+Paraguay+x3

[10] Rosa Elena María Di Martino Ortiz. "Comercio electrónico en Paraguay: alcanzando metas". [Online] http://43jaiio.sadio.org.ar/proceedings/SID/7.pdf

[11] acraiz.gov.py. "Ley de Comercio Electrónico fue reglamentada". [Online] http://www.acraiz.gov.py/index.php/77-institucional/100-comerelect

[12] Organización Mundial del Comercio. "Quiénes somos". [Online] https://www.wto.org/spanish/thewto_s/whatis_s/who_we_are_s.htm