



Design and Development of an E-Commerce Management System: State of Places

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ABSTRACT

In this work, we are interested in exchange relations and in particular e-mailing. Our goal is to provide a research methodology for the design and development of an e-commerce management system based on e-mailing. Thus, we define the e-commerce concept by providing a historical overview and by defining the different varieties of seller-buyer relationships and comparing it to the e-business concept. Then, we define the basic concepts of e-mailing, the benefits of a quality e-mailing, then we define the e-mailing software and their characteristics by proposing software examples. Finally, we propose a research methodology for the design and development of an e-commerce management system.

KEYWORDS: E-commerce, E-Mailing, Research Methodology, Design, Development, E-commerce Management System

I. INTRODUCTION

Online commerce or e-commerce is the exchange of currencies of goods, services or information via computer networks, in particular the Internet. In business-to-business commerce, companies have used Electronic Data Interchange (EDI) type networks for many years. The term "e-commerce" also includes the overall flow of data.

E-commerce or electronic commerce brings together all commercial transactions taking place remotely through electronic and digital interfaces. It essentially encompasses commercial transactions carried out on the Internet from different types of terminals (computers, tablets, smartphones, consoles, connected TVs) on e-commerce sites or merchant mobile applications. E-commerce has become the main channel for distance selling, which explains the replacement of the term "mail order" by "distance selling".

According to Fevad¹, the turnover of French e-commerce amounted in 2019 to 103.4 billion Euros for 1.7 billion transactions with an average basket of 60 Euros and for a total of more than 200 000 merchant sites. M-commerce is a

component of e-commerce which represents 39% of the market, amounting to just over 40 billion Euros.

Still according to Fevad, e-commerce represented only 10% of retail trade in 2020. However, e-commerce only covers part of the challenges of Internet commerce because the presence of companies on the Internet also influences purchases made at points of sale or through other channels [1].

In our work, we are mainly interested in exchange relations and in particular electronic mailing (e-mailing). Through this work, we first define the e-commerce concept by offering a historical overview and defining the different varieties of seller-buyer relationships and compare it to the e-business concept. In a second part, we define the basic concepts of e-mailing, the benefits of a quality e-mailing, then we define e-mailing software and their characteristics by offering examples of software. In a third part, we propose our research methodology concerning the design and development of an e-commerce management system.

Our objective in this work is to propose a research methodology concerning the design and development of an e-commerce management system based on e-mailing.

II. E-COMMERCE

A. Historical overview

The Electronic Commerce Foundation was founded by Michael Aldridge in 1979. He uses a telephone line to

¹ The Federation of e-commerce and distance selling (Fevad) is a French trade union created in 1957, bringing together more than 500 companies with a distance selling activity regardless of the means of communication used (Internet, correspondence, telephone, etc.). Fevad is a member of the Movement of enterprises the France (MEDEF).

connect the television to the computer. While this is different from e-commerce as we know it today, his idea spawned the idea of not going to a physical store to shop. Bill Gates and Steve Jobs popularized computers for ordinary people. Without computers, e-commerce would be very different [2].

The emergence of online commerce is directly linked to the emergence of the Internet in the early 1990s. On August 11, 1994, Phil Brandenberger, a resident of Philadelphia, used a secure card payment system to place the first order online banking. The New York Times reported on the incident and pointed out that a small click by an individual was a huge economic leap [3]. This first purchase of \$ 12.48 for a Sting album was the cornerstone of a building that has continued to grow ever since.

In 1994, Jeff Bezos founded Amazon, an online store that sold over a million different books when it was launched. Amazon has become the most popular online store for consumers to purchase all types of products [4].

In the mid-1990s and early 2000s, we noticed the presence of computers in the home, paving the way for the development of electronic commerce. From the early to mid-1990s, businesses accepted checks because there were no online payment gateways to transfer funds from customers to businesses. When PayPal was founded in December 1998, it simplified the customer's shopping experience because credit cards were easily accepted.

In the 2000s, in the presence of platforms, companies were able to create their e-commerce with little or no development skills required. The entry barrier was thus lowered. Now, anyone with a computer connected to the Internet and a little bit of capital on hand could set up an e-commerce online store without much difficulty.

In 2008, online sales accounted for 3.4% of total sales, showing the growth of the industry. In 2014, it is estimated that there are around 12 to 24 million online stores around the world. We are rapidly entering 2020 and the knowledge gap between beginners and more advanced e-commerce professionals is rapidly narrowing. With the proliferation of blogs and online resources, industry tips, tricks and strategies can be obtained with just one click. Now anyone can build a website overnight and start seeing results from their efforts in less than six months.

B. Varieties of seller-buyer relationships

Based on the nature of the seller-buyer relationship, these types are:

- Business-to-business online commerce, often called B2B (business to business) [5]. There are also products sold online exclusively to professionals such as textiles (a person can order online professional clothing personalized to their size, with their name embroidered on the clothing), wine, plotters, plan copiers, scanners, construction equipment (meters, lasers, etc.), ...

- Business-to-government electronic exchange, often referred to as B2G (Business to Government) or B2A (Business to Administration) is a type of marketing derived from business-to-business (or B2B) online commerce that encompasses the marketing of products and services to destination of administrations, whether local authorities or the government [6]. It concerns websites developing a commercial activity between one or more private companies and one or more governmental organizations. B2G networks provide a platform for companies, they make proposals on the possibilities of government, the proposals are presented as solicitations in the form of tenders which are done in a reverse auction fashion.
- Electronic exchange between a company and its employees, called B2E (Business to Employee) is an expression which characterizes all the exchanges (services and products) that a company intends for its own employees [7]. The Intranet is the main support for Business to Employee applications.
- Online commerce for individuals, or B2C (Business to Consumer or Business to Client) [8]. These are merchant websites, among the main goods and services sold over the Internet to individuals include:
 - cultural goods such as books, CDs and DVDs, etc. ;
 - technological devices such as PCs, electronics, hifi, etc. ;
 - tourism and travel such as train tickets, plane tickets, rentals, etc. ;
 - consumer products with online supermarkets;
 - printing products: announcements, business cards, brochures, commercial supports;
 - home products, clothing, childcare, etc.
- E-commerce between individuals, or C2C (Consumer to Consumer) [9]. These are sales websites between individuals, three exchange systems coexist: auctions (EBay, iCollec, etc.), trusted third parties (PriceMinister.com, Fnac.com, etc.) and classifieds (Le Bon Coin, top adverts, etc.).

C. Difference between e-commerce and e-business

Although one of the pillars of e-business is e-commerce, these two terms have totally different meanings. Indeed:

- E-commerce allows a merchant to simply sell their products online, so it is mail order sales on the Internet. Online commerce does not guarantee the success of the site in itself, as it only offers functionalities limited to the shopping cart, and provides basic management of the online catalog. It does not deal with the fundamental problems linked to the development of a vertical community around the site, customer loyalty, the establishment of customer / merchant trust, sales optimization, analysis of

customer behaviour, ... Online commerce tends towards a convergence of the web and the mobile [10].

- E-Business involves upstream implementation to make a sale a reality and ensure customer loyalty. It is made up of “exchange relationships” of a different order (mailing, loyalty campaigns, promotions, after-sales service, etc.). An e-business solution is a set of tools which, on the one hand, make it possible to create an online commerce site and, on the other hand, provide the merchant with all the means necessary to prospect and retain customers (gift lists, loyalty points, cash rebates, gift vouchers, rebate coupons, sponsorship, affiliation, etc.).

III. THE E-MAILING

A. Mailing and e-mailing

A mailing refers to the mass mailing of advertising information by post or electronically. Originally reserved for physical promotional mail, the term now applies equally to physical and electronic mailings (e-mailing) in the form of a message or a personalized offer in the letterbox or in the email box. Today, everyone is used to receiving "mailings", whether physical or electronic. Often used in commercial prospecting, mailing is also used to retain brand customers. But what is the difference between mailing and e-mailing? The underlying concept is the same: it's about sending promotional messages to prospects or customers. The term e-mailing is specifically used when talking about electronic direct mail (emails), while the term "mailing" is more generally applied to the mass sending of promotional e-mails.

Mailing and e-mailing are part of what is called direct marketing. As the name suggests, it's all about speaking directly to your audience, prospects and customers whose messages are sent to them that are personalized. The message sent usually contains the name and / or first name of the recipient as well as a personalized offer based on the interest shown by that person in a product or service. The objectives of mailing and e-mailing are multiple: increase visibility with prospects, convert them into customers and retain them.

B. E-mailing

E-mailing refers to a direct marketing technique aimed at sending a message through the e-mail channel, also called online direct mail² or electronic direct mail³, is a direct marketing method that uses email as a means of mass commercial communication to send messages to an audience. The term is generally used to denote:

- Sending emails in order to strengthen an advertiser's relationship with current or former customers, in order to encourage customer loyalty;
- Sending commercial emails for the purpose of acquiring new customers or persuading existing customers to purchase a good or service now or in the future;
- Sending newsletters in order to provide value-added content to its customers in order to retain them, be relayed and gain brand image.

Note that direct marketing pairs very well with other marketing strategies today such as Facebook ads or retargeting. . In most cases, the goal of emailing is to retain customers and convert leads.

A. Prospecting e-mailing

The prospecting e-mailing is used during a recruitment campaign. The goal is to build an e-mail database that will subsequently be used for commercial purposes. This database must be opt-in and have a close link with the target determined upstream (eg a "female" database for an e-mailing selling tights).

B. Loyalty e-mailing

Loyalty e-mailing consists of sending messages in order to stimulate and inform the customer. These messages are ultra-personalized in order to offer products related to the order already placed, often as part of CRM actions⁴. This personalization of customer relations will be developed thanks to:

- Implementation of different e-mailing scenarios;
- Better management of customer life cycles;
- Better management of the database wear rate;
- Development of predictive marketing;
- Development of behavioral segmentation.

An e-mailing can also be used for a registration with a welcome e-mail, a periodic newsletter or a reminder following shopping cart abandonment.

C. Contribution of a quality e-mailing

To have a quality e-mailing, there are five essential points to consider:

1. Having a quality mailing list: The basis of e-mailing is having a quality mailing list. Indeed, to make an online mailing, it is necessary to need correct information about the audience. So, if the people you want to reach are already customers, you probably already need their information such as their email address. If not, there are various ways to get this information; such as providing a white paper or accessing content that interests them. Note that you

² Online direct mail”, on FranceTerme, General Commission of Terminology and Neology.

³ "Electronic mailing" Le Grand Dictionnaire terminologique, Office québécois de la langue française.

⁴ Concept which aims to increase the commercial performance of the company in its account management by strengthening the link with its customers (relationship marketing) and / or to increase the rate of transformation in the conquest of new customers (transactional marketing).

must take the greatest care of the e-mailing list by making sure not to have duplicates, erroneous or inactive e-mail addresses, and especially to only target interested people. In addition, having relevant information about contacts, the more you can customize the mailings according to their preferences, which is the key to a successful field.

2. Obtain the consent of all your recipients (GDPR)⁵: The legal aspect of e-mailing should not be overlooked. Indeed, since the entry into force of the GDPR at European level, it is mandatory to obtain the consent of recipients of B2C e-mail communications. Thus, for a company, it is necessary to have explicitly given their authorization (the recipients) for the collection of the use of their personal data (such as their e-mail), on the other hand the work with professionals only, n ' does not require the company to have permissions.
3. Be clearly identifiable as the sender: To send an email to a recipient, you have to be careful in a few seconds. Indeed, too often, direct marketing communications are just not direct enough. You have to write the name of the company clearly, including your logo and the graphic charter to be recognized quickly. Thus, being identifiable in this way creates a relationship of trust with the recipients, who will in the future be able to recognize the company's messages. Indeed, a mail whose subject and sender seem opaque is likely to end up in the wastepaper basket, or in its digital equivalent: the spam directory.
4. Personalize your communications: Everyone likes to feel a little bit special, unique. It's normal, it's human. Conversely, nothing could be worse than feeling like a lost figure in the crowd, one number among many. Thus, including information such as the first and last name of a recipient in e-mail communications is a simple and effective way to ensure that you create a trusting, personalized relationship with them.
5. Include a clear Call To Action: The Call To Action (CTA) is an incentive to perform an action that is the objective of the e-mailing: for example, to buy a product from your e-commerce store. This Call-To-Action will therefore most often take the form of a link or a button with an incentive text such as "See the product" or "Take advantage of it!" ". This allows the Customer to act to:
 - Register for an event;
 - Subscribe to your newsletter;
 - Buy a product or service;

- Download a checklist or ebook.

By way of concluding this section, the possibilities are endless and depend on the business. What is important is to be clear about your purpose in your communications and to include it. Thus, e-mailing is a technique which makes it possible to attract and retain prospects and customers by communicating to them news or personalized sales offers online, e-mailing creates a link between its audience and its company. Emailing has become one of the most important channels for online promotion today, including through platforms that simplify sending mass campaigns while allowing optimal personalization for each recipient.

D. E-mailing software

To carry out an e-mailing campaign, there are e-mailing software and applications accessible from a web browser. Which generally offer a routing service (SMTP) as well as a statistics service that allows you to know who opened the message and who clicked on the hyperlinks.

A. Routing service (SMTP)

Simple Mail Transfer Protocol (SMTP) routing services, is a communication protocol used to transfer e-mails to an e-mail server. SMTP is a fairly straightforward protocol. We first specify the sender of the message, then the recipient of the message, and then, usually after verifying their existence, forward the body of the message. We can use the telnet command on port 25 of the remote server to test the SMTP server. SMTP began to be widely used in the early 1980s as a supplement to UUCP6, which is more suited for transmitting e-mail between intermittent machines. On the other hand, SMTP works best when the machines that send and receive messages are constantly interconnected.

B. Statistics service

Most messaging solutions provide metrics to measure campaign results. The most frequently cited metrics are how quickly messages get to their destinations, open rates, click-through rates, and unsubscribe rates. A study conducted by Campaign Monitor in 2020 showed that the average email open rate was 17.8% [11].

C. Software examples

Sendmail is one of the first, if not the first, e-mail server to use SMTP. Sendmail is an open source email server. It takes care of the delivery and sending of e-mails. A descendant of ARPANET software, Sendmail is a very flexible program supporting a wide range of e-mail transfer and delivery means, including the popular SMTP. The first version of Sendmail was written in the early 1980s by Eric Allman of

⁵ GDPR, (General Data Protection Regulation), is a regulation of the European Union which constitutes the reference text in matters of personal data protection. According to the European Council - April 11, 2016.

⁶ Unix to Unix Copy (UUCP) is a set of programs that allow two machines to exchange files and execute commands on the remote machine through a telephone line (modem), but also on a TCP / IP layer (often via SSH), or even via a direct serial cable (null modem). However, modem mode remains the most widely used scenario. Its name derives from "cp", the command for copying files locally on a UNIX system.

the University of California, Berkeley). Sendmail is widely criticized for being slow, complex and difficult to maintain compared to other Mail Transfer Agents (MTAs). However, it has long been the most popular MTA on the Internet, which is certainly due to its implementation by default in various UNIX variants.

Postfix is an e-mail server and free software developed by Wietse Venema and several contributors. It takes care of email delivery and was designed as a faster, easier to administer, and more secure alternative to historical Sendmail. It is the default mail server in many UNIX-like systems. It is released under the IBM Public License 1.0. It is a free license, but incompatible with the GPL. Postfix was first known as VMailer and later IBM Secure Mailer. It was written by Wietse Venema during his time at the IBM T. J. Watson research center. The first version was released in mid-1999 [12].

Qmail is an e-mail server for Linux and other Unix derivatives, created by cryptologist Daniel J. Bernstein. It allows you to set up an SMTP service for sending emails. It has the same utility as sendmail or postfix and exim, but it has a modular architecture, comprising a set of simple commands, according to the KISS rule (keep it simple and stupid), making it efficient and secure [13].

Exim is an electronic mail server used on many UNIX-like systems. The first version was written in 1995 by Philip Hazel for the IT department of the University of Cambridge: the name then stood for EXperimental Internet Mailer. Originally based on Smail, it has evolved into one of the most flexible and robust MTAs around [14].

Thus, some software bills their services according to the number of emails sent. The user purchases packs of hundreds, thousands, or hundreds of thousands of emails. More recently, some publishers offer unlimited mailings and charge according to the number of contacts. This is a way to prevent the platform from being used to clean contact bases.

IV. RESEARCH METHODOLOGY

Scientific research is a dynamic process, a rational method which makes it possible to examine phenomena, problems to be solved, and to obtain precise answers from surveys. The characteristic of this process is that it is systematic and rigorous, and that it leads to the acquisition of new knowledge. The function of research is to describe, explain, understand, control and predict facts, phenomena and behaviors. Scientific rigor is guided by the concept of objectivity, that is, researchers only deal with facts within a framework defined by the scientific community.

Based on the ADDIE model which has five stages: analysis, design, development, implementation and evaluation, we will first of all deal with the first part which concerns the analysis by making a study of the 'existing concerning e-commerce management systems existing in the market. Through this study, we will cite the systems that exist by analyzing the characteristics of each system to define its

advantages and disadvantages. This will allow us to propose our needs for our management system and to produce specifications for our work.

The second step of our methodology concerns the design of our based on the results obtained during the first step of our research. Through this step, after having chosen the modeling language which in our case concerns the UML (Unified Modeling Language), as the modeling language. It is a graphical and textual modeling language intended to understand and describe needs, specify, design solutions and communicate points of view. Thus, we will propose the different modeling diagrams of our system.

The third step which concerns the development, we will define in the first part the development process which concerns in our case, the 2TUP process (2 Tracks Unified Process) which is classified among the unified processes and which is based on UML (Unified Modeling Language).) as a modeling language. We then define all the development languages and tools used in the development of the system.

The fourth step concerns the implementation of our system in a server. In fact, the first part concerns the definition of the different stages of the installation of the system in a server to bring it online. The second part concerns the implementation of the system in the server.

The fifth and final step of our work concerns the evaluation of our system by experts in the field and by carrying out concrete tests.

V. CONCLUSION

As a conclusion to this work, after having defined the basic concepts of e-commerce on the one hand and e-mailing on the other hand, we have proposed a methodology of our research which concerns the design and development of an e-commerce management system in the sense of proposing in our future work the results of the different stages of our research.

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