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EVALUACIÓN CUANTITATIVA COMPARATIVA DE SITIOS WEB COMERCIALES: EL ÍNDICE DE NIVEL DE COMERCIO ELECTRÓNICO

AVALIAÇÃO QUANTITATIVA COMPARATIVA DE PÁGINAS WEB COMERCIAIS: O ÍNDICE DE NÍVEL DE COMÉRCIO ELETRÔNICO

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COMPARATIVE QUANTITATIVE EVALUATION OF COMMERCIAL WEB SITES: THE ELECTRONIC COMMERCE LEVEL INDEX

Abstract

This research seeks to fill the void of objective instruments for measuring business to customer (B2C), product-based, electronic transactions by developing the 'E-commerce level index' (ECLI), a tool working with different categories of variables related to what a company must have in its web page in order to allow proper development of commercial transactions via electronic means, especially cross-border transactions. The ECLI is then applied to thirty apparel and cosmetics firms in the United States, Brazil, and Colombia. The U.S. firms have the highest ECLI rating in both industries, followed by Brazil and Colombia, consecutively. When analyzed by transaction stage, the overall ratings are in the same order; however, each country demonstrates distinct strengths and weaknesses by industry and by transaction process.

Key words

Electronic commerce, web design, content analysis

Clasificación JEL: L15, L81, M32

EVALUACIÓN CUANTITATIVA COMPARATIVA DE SITIOS WEB COMERCIALES: EL ÍNDICE DE NIVEL DE COMERCIO ELECTRÓNICO

Resumen

Este estudio busca proveer un instrumento objetivo para medir las transacciones electrónicas, basadas en productos, con el consumidor final, al desarrollar el E-commerce level index (ECLI) (Índice de nivel de comercio electrónico), una herramienta que mide distintas categorías de variables relacionadas con lo que una empresa debe tener en su página web para permitir de desarrollo adecuado de las transacciones comerciales vía medios electrónicos, especialmente las transacciones trans-fronteras. El ECLI se aplica a treinta empresas de vestuario y de cosméticos en los Estados Unidos, Brasil y Colombia. Las empresas de los Estados Unidos logran la calificación más alta en el índice, seguidas por Brasil y Colombia, consecutivamente. Cuando se analice por fase de transacción, cada país demuestra distintas fortalezas y debilidades por industria y por proceso transaccional.

Palabras clave

Comercio electrónico, diseño de página web, análisis de contenido

AVALIAÇÃO QUANTITATIVA COMPARATIVA DE PÁGINAS WEB COMERCIAIS: O ÍNDICE DE NÍVEL DE COMÉRCIO ELETRÔNICO

Resumo

Este estudo busca prover um instrumento objetivo para medir as transações eletrônicas, baseadas em produtos, com o consumidor final, ao desenvolver o "E-commerce level index" (ECLI) (Índice de nível de comércio eletrônico), uma ferramenta que mede distintas categorias de variáveis relacionadas com o que uma empresa deve ter na sua página web para permitir o desenvolvimento adequado das transações comerciais via meios eletrônicos, especialmente as transações trans-fronteiras. O ECLI se aplica a trinta empresas de vestiário e de cosméticos nos Estados Unidos, Brasil e Colômbia. As empresas dos Estados Unidos conseguem a qualificação mais alta no índice, seguidas pelo Brasil e pela Colômbia, consecutivamente. Quando se analisa por fase de transação, cada país demostra distintas fortalezas e debilidades por indústria e por processo transacional.

Palavras-chave

Comércio eletrônico, desenho de página web, análise de conteúdo

I. Introduction

Taking into account economic turmoil, globalization, and technological breakthroughs, it becomes evident that there is an ever-rising need to adapt to and seize the changing environment of markets world-wide. The latest trends in the economy and commerce have been fostered by the technological era we live in, basing such innovations on sophisticated and fast paced dynamics.

The paramount characteristic of this technological era is the Internet revolution, which features in every aspect of our lives, including the way we conduct and develop business.

The Internet not only created a new online world, it also led to the creation of new business models, models that enable sole entrepreneurs to reach the global markets, SMEs to breach their limitations, and large corporations to enhance their performance as well as diversify into areas which may not be open to them in the conventional ways. (Aziz & Poorsartep, 2009, p. 186).

In other words, "the Internet has permitted the creation of many businesses which would not have been viable with bricks-and-mortar structure" (Hernández, Jiménez & Martín, 2009, p 362).

2. Electronic commerce

E-commerce refers to the exchange of goods or services via an electronic medium such as the Internet. In addition to the basic transaction, providers may introduce complementary functions such as customer service and advertising. The related concept of M-commerce is specific to those transactions conducted via a mobile communications network and device.

The dynamic nature of E-commerce stands out, facilitating the sale and purchase across geographic gaps, overcoming markets asymmetries, and successfully withstanding current economic turmoil. According to Cosgrave (1999), the three signs that prove E-commerce is creating new ways of doing business are the fact that information is becoming more valuable, distance or space are disappearing, and growth is occurring very quickly.

Furthermore, E-commerce offers numerous benefits, including fast and inexpensive marketing, speed and accuracy of transactions, convenience, competitive research, reduced overheads, and up-to-date information (Plonien, 1998). More specifically, Turban, King, Lee and Viehland (2006) distinguish three types of benefits according to the party enjoying them (organizations, consumers, and society). Organizations enjoy global reach, cost reduction, and customization. Consumers can choose from more products and services, which will be offered at lower prices as no tax will be levied on them; and society benefits from a higher standard of living and hope for the poor, among others.

In addition to the aforementioned benefits, it is important to emphasize *value creation* as the most important advantage of E-commerce. Amit and Zott (2001) assure how "new ways of creating value are opened up by the new forms of connecting buyers and sellers in existing markets and by innovative market mechanisms and economic exchanges" (p.499). Hence, companies undertaking E-commerce as their business model can deliver products and services with added value, thus improving their competitiveness.

This value is created mainly from achieving a significant procedural cost reduction and by offering differentiated products and services with unique characteristics. According to Turban et al. (2006), the former statement is explained by the following logic: production costs decrease due to the increasing returns of scale and low transaction cost; while revenues increase due to the broad reach of the Internet; plus, the transaction risk is reduced as product differentiation is created. "These improvements often lead to price reduction and increased margin and sales turnover" (Mahadevan, 2000, p. 57).

Simultaneously, the benefits and value creation E-business offers, along with the technological revolution, have enabled the development of new business models and reinvention of existing ones. A change in business models implies an evolution in the economy itself, and the most relevant change brought by E-commerce is the gradual disappearance of traditional intermediaries in transactions. Cosgrave (1999) explained this phenomenon by affirming that:

Traditional distributors and agents are threatened by a network economy in which buyers can deal directly with sellers. However, the sheer mass of digital information generated by individuals requires a new type of intermediary – an organization that can aggregate data into usable information. (p.4)

More recently, Turban et al. (2006) highlight the impacts of E-commerce in business process and organizations, as it enables the improvement of direct marketing through changes in the sales channel, advertising innovations, and customization options; and it also transforms and redefines organizations through technology implementation in business areas and procedures.

3. Electronic commerce level index (ECLI)

The numerous advantages brought by E-commerce have triggered the wide use of such trends, which in turns is increasingly influencing the new dynamic economy. Therefore, it becomes of utmost importance to design tools for measuring and assessing the levels at which companies have developed their business channels and operative capacities to conduct electronic commerce and ultimately seize the online market, which holds big potential as "the amount of money spent by online shoppers virtually doubled every year" (Miranda Gonzalez & Banegil Palacios, 2004, p. 314).

When measuring companies' levels and variations of E-commerce, a constraint arises: there is no clearly designed and defined tool to evaluate levels of E-commerce. Even though there are significant and highly utilized indexes (like the Web Assessment Index – WAI) to measure a company through elements of its web page, these indexes only focus on rating and evaluating companies' appropriate web page design (Miranda Gonzalez & Banegil Palacios, 2004). Other limited evaluation proposals included those of Zhu and Kraemer (2002) who propose a set of E-commerce metrics, specific to manufacturing firms, consisting of four dimensions-information, transaction, customization and supplier connection and Straub, Hoffman, Weber and Steinfield (2002) who propose metrics specific to on-line customer retention.

This research seeks to fill the void in measuring tools by developing the 'E-commerce level index' (ECLI), a tool for quantifying the level at which a company has acquired or developed an optimal level of E-commerce (Gómez, Capón, & Zwerg-Villegas, 2010). The index was designed as a standard tool, for assessing both completely virtual and click-and-mortar companies engaged in product-based, business-to-consumer (B2C) transactions. The ECLI will facilitate "direct comparisons between individuals, time periods, industries, cultures, or geographic regions" as Green & Pearson (2009, p. 20) recommend.

The ECLI consists of four categories, reflecting the four stages of conducting a commercial transaction. The first category is *Product Information*, where variables belong to the stage in which the customer is self-informing and searching for products. The second category is the *Buying Process*, where variables belong to the stage in which customers quote, buy, and confirm the order of their purchase. The third category includes variables of the *Delivery Process*, from shipment options to order tracking. Finally, the last category, *Customer Support,* includes the communication and interaction between customers and the company and the establishment of after-sales support. Each category consists of several variables related to the given stage, and all of them can be evaluated by looking at the front end of the

main web pages, thus yielding ease of use. Table 4 details the variables associated with each of these four stages and provides a simple structure in which to rate each variable, as explained in the following paragraphs.

The composition of the the ECLI, which is the rate (from 0% to 100%) at which a company has properly developed tools for conducting B2C commercial activities via electronic means, needs no subjective weightings as it works with a binary scale. Each variable will be rated with one (1) or zero (0), accordingly, if one can find the variable (tool) in the web page under evaluation or not. The rating system provides the index with objectivity, as each of the 34 variables is not rated with a qualitative, hard-to-define scale but rather with radical values representing the existence or inexistence of the variable. Hence, the ECLI manages to overcome the main restraint-subjectivity-faced by previous indexes related to E-commerce web pages.

Table 4: ECLI Variables

PRODUCT INFORMATION		**BUYING PROCESS**	
Variables	*Rating*	*Variables*	*Rating*
Search engine		SHOPPING CART	
ELECTRONIC CATALOG WITH PRODUCTS		PAYMENT GATEWAY	
General product information		QUANTITY SELECTION	
Warranty information		Product availability	
Product Customization		Quotes in other currencies	
ELECTRONIC CATALOG WITH PRICES		Safety exit	
Product comparison			
Customer Product review			
Information share with friends			
Special offers			
DELIVERY PROCESS		CUSTOMER SUPPORT	
Variables	*Rating*	*Variables*	*Rating*
Delivery policy		Site map	
COST ESTIMATION (product+delivery)		Language selection	
SHIPPING TIME		Timeliness content	
Shipping options		FAQ (frequently asked questions)	
Country shipping information		CONTACT US	
Order tracking		Chat rooms with the company	
Order confirmation via e-mail		HELP	
Gift wrap /card available option		Personal Account	
Returns policy		Personalized information via e-mail	

Source: Authors`conceptualization. Previously presented at the International Academy of E-Business. (Gómez et al., 2010).

The essential variables, those in capital letters in the table, are those tools highly needed for a company to conduct, even in the most basic way, an electronic transaction: electronic product catalog, electronic price list, cost estimation, shipping time, shopping cart, payment gateway, quantity selection, contact us, and help. These variables differ from the value enhancer variables, those in lower case letters in the table, as the latter facilitate the commercial transaction but are not required for it to occur. Hence, following the objectivity characteristic of the index, the essential variables and the value enhancer variables must be differentiated so as to properly reflect levels of E-commerce and eventually make sound comparisons. The differentiation lies in the weights given to each variable: essential variables will weigh twice the value enhancers when compounding the result as a weighted average.

$$\mathrm{ECLI} = \frac{1}{n_1 + 2n_2} \times \left(\sum_{i=1}^{n_1} a_i + \sum_{j=1}^{n_2} 2a_j \right) \times 100$$

Where:
n_1: number of value enhancer variables
n_2: number of essential variables
a_i: ratings of value enhancer variables
a_j: ratings of essential variables

Note how the ECLI is a flexible index allowing changes in ratings, weights, and number of variables in order to respond to what the user considers most appropriate for the evaluation.

4. Applying the index

This section will describe the application of the index based on choosing three countries and two industries to assess their levels of electronic commerce and make cross-comparisons. The index is used to rate E-commerce in the apparel and cosmetics industries of the United States, Brazil, and Colombia.

Each of the countries chosen represents a socioeconomic category of the countries' classification: developed, newly industrialized, and developing, respectively. The ECLI is designed to be applied in a standardize way, to a wide range of companies with a sole restriction on service companies. Therefore, this index is especially appropriate for making cross-comparisons between countries, industries, and companies.

The industries chosen were the apparel and cosmetics sectors because of their increased efforts in reaching customers through the Internet and a growing user trends, especially in newly industrialized countries such as Brazil. For the assessment, five companies from each country and sector were chosen; the most representatives of the market, and the ones perceived by the authors as the biggest sellers of apparel and cosmetics. For the process of company selection, a general study was conducted along with informal interviews of young women who live or have lived in those countries.

This research did not include a rigorous selection process as the main purpose was not to compare firms, industries, or countries. Rather, the selection was somewhat arbitrary so as to soley test the application of the newly developed index. After defining the specific companies to be rated, the ECLI scheme with the four proposed categories was addressed. The rate for each variable was given by surfing the company's official web page in order to identify whether each of the 34 variables were included on the webpage. The variables found on the web page, as a tool for facilitating electronic commerce, were rated with one (1) and those not available with zero (0).

The ECLI was computed using the weights of the essential and value enhancer variables for each of the companies following the equation of the index. Furthermore, the average of those five companies was compounded as the representation of the level of electronic commerce of the industry. After following the process of filling the scheme and utilizing the equation, the data of the ECLI as a percentage

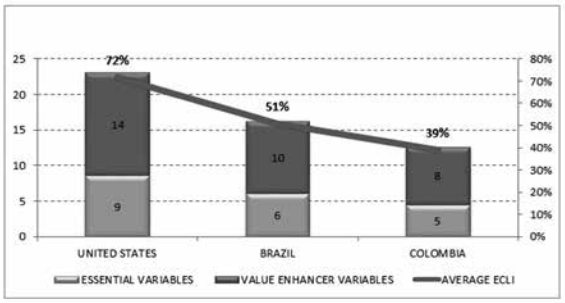
rate for 30 companies was obtained. Mixing and grouping the results, and indications about the firms, industries, and countries were achieved.

5. Results

5.1 Ecli by industry

Starting with a cross-country comparison, the findings suggest a higher level of electronic commerce in the apparel industry for the United States with an average electronic commerce level of 72%, followed by Brazil with 51% and Colombia with 39%. Graph 1 visually displays the country level findings, by essential variables and value enhancer variables, in the apparel industry.

Graph 1: E-Commerce country-level comparisons in the Apparel Industry

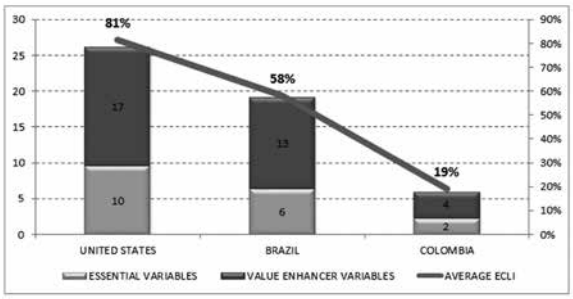


Source: Authors` research to test the ECLI application

Note that the spot trend in the total rating is also held for the average number of variables from each category. The United States is the country in this industry with the highest number of essential variables found on their web pages, with an average of 9 out of 10; followed by Brazil with 6, and Colombia with 5. The same happens for the value enhancer variables, with the United States in the first place with 14 variables out of 24, Brazil 10, and Colombia 8.

The findings for the cosmetics industry yielded the same country position for the ratings, being the United States the country with the most developed electronic commercial cosmetics industry, with a rate of 81%, Brazil with 58%, and Colombia with 19%, as visually represented in Graph 2.

Graph 2: E-Commerce country-level comparisons in the Cosmetic Industry



Source: Authors` research to test the ECLI application

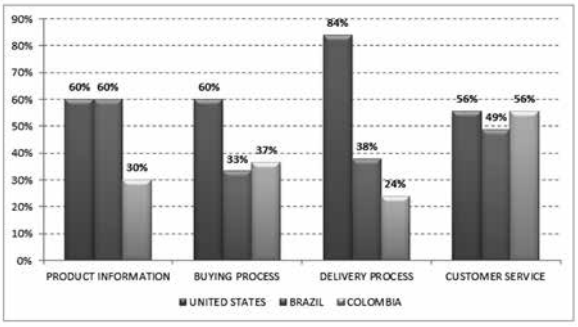
Again, the United States is the country with the highest average number of both essential and value enhancer variables, followed by Brazil and Colombia. In this industry, the United States proves to be completely functional in terms of essential variables; however, there are still value enhancer variables to be included to reach a higher level of sophistication and user friendliness.

A commerce level above 75% is considered high and one may conclude that the industry is well developed toward selling its products through the Internet, and doing so properly according to the four stages of the process identified by Gomez et al. (2010) The United States and Brazil show a comparatively higher rate of electronic commerce for the cosmetics industry while Colombia proves to be comparatively stronger in the apparel industry, though much weaker than the other two countries.

5.2 ECLI by stages

After analyzing the general results in a cross-country comparison for both industries, it is appropriate to go deeper in to the results, assessing the performance of the industries in each one of the process stages, with the aim to recognize strengths and weaknesses. Graph 3 provides visual representation of the country level comparisons across the four stages.

Graph 3: ECLI Stage Performance for the Apparel Industry



Source: Authors` research to test the ECLI application

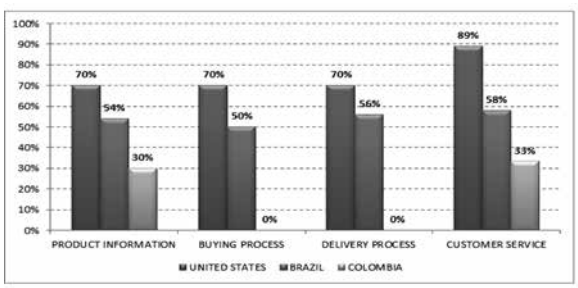
In the apparel industry, the stage comprising the Product Information is developed to a 60% level for the United States and Brazil and only 30% for Colombia. To improve the rating in this stage, the U.S. firms should mostly improve in the tools of information share with friends and search engine. Brazil, on the other hand, should focus on warranty information and products comparison. Colombia has plenty scope improve, but should focus mainly on warranty information, product customization, and products comparison.

The Buying Process stage is on average the least developed by the three countries in the apparel industry. The United States rating is 60%, while Brazil is only 33%, and Colombia 37%. The biggest weakness for the U.S., in this stage, is the quotes in other currencies. Brazil should focus on the information about product availability and the establishment of safety exit. Colombia could further strengthen this stage by developing quotes in other currencies.

An important process in any electronic transaction is the Delivery Process. The rating in this stage was outstanding for the apparel industry in the United States, earning the highest percentage of all stages, at a level of 84%. This high level responds to advanced and efficient logistics. Both Brazil and Colombia should focus on improving the tools of shipping options and country shipping information.

Finally, the last stage in a commercial transaction is the after-sale support and interaction with customers. Even though it is sometimes undervalued, this stage is as important as other stages and, therefore, needs to be taken into account for the overall rating of levels of E-commerce. The rating for this stage in the apparel industry was rather atypical. Here both the United States and Colombia have a rating of 56%, while Brazil has 49%. Colombian high performance is explained by its historical good service and customer driven marketing in their traditional businesses. Now, analyzing the performance of the cosmetics industry according to the four stages, the results yielded are depicted in Graph 4 and are discussed below.

Graph 4: ECLI Stage Performance for the Cosmetics Industry



Source: Authors` research to test the ECLI application.

The United States cosmetics industry has the highest rating among the three countries, with an average of 70% development of the tools belonging to the Product Information stage. It is followed by Brazil with 54% and Colombia with 30%. The U.S. could reach a better performance in this stage by offering product customization and enabling tools for product comparison. Brazil should improve the warranty information offered about its products. Colombia must substantially increase the availability of tools for this stage, in particular by developing the essential variable of an Electronic catalog with products.

The Buying and Delivery Process stages are both rated as 70% for the United States and around 50% for Brazil. Colombia has 0% in both stages, which reflects the fact that its cosmetic industry has not engaged yet in the electronic transaction process and has only certain electronic information related to product information and customer support online but does not enable their customers to conduct online purchases nor has delivery of the products.

The United States customer service in the industry marks the highest score in any of the stages for both industries, reflecting the importance of customer follow up and support in cosmetics purchases.

6. Discussion

The E-commerce level index (ECLI) provides an objective, quantitative tool to simply calculate a firm´s level of optimization of electronic commerce, from the customer´s perspective. The firm can easily determine its own strengths and weaknesses and can compare them with other firms in its industry. At the country level, the tool may provide information for government officials interested in promoting commercial technological advances. This cross-country perspective is particularly important in E-commerce since physical location of the business and of the customer can potentially become irrelevant.

Given the rapid advancements in mobile technology, the user may wish to include in the ECLI not just computer applications but also tablets and telephone applications. Adding this variable will in no way affect the simplicity of usage since the ECLI is a flexible index allowing changes in number of variables, as well as rating and weights, in order to respond to user criteria.

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