E-Supply Chain Management: A Review

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Abstract: These days, internet-based electronic marketplaces (EMs) are widely expanded all over the world. They emerge in different industries, supporting the various exchanges of goods or services with and for different types of actors, and are following different business principles and models to face up to its competitors and fulfil its ambitions. Most observers have suggested that electronic marketplaces would emerge to prevail over the electronic business area. This article aims to propose a critical review based on existing literature, over the electronic marketplaces and imposes the supply chain management research in respect of this issue.

Key words: Electronic marketplaces, electronic commerce, digital economy, digitalization, e-supply chain management, electronic business, relationships, mobile commerce, information technology.

1. Introduction

The world of business is being changed to an e-economy or digital economy. Currently, it is undergoing a digital transformation and it's happening at breakneck speed. No industry is left untouched. The principle of the numerical economy is hyper connection which stands for increasing connectivity of people, organizations, and equipment that turn out from the network, mobile technology or other internet devices. The digitization of everything is forming new intelligent digital networks that essentially change the way commerce is managed, optimized, shared, and deployed. In current customer-based marketplace, supply chain management has become a determining factor to competitive benefits. But, having accepted the challenge to create a synchronized supply chain that can compete in the future e-economy, what concrete capabilities must then be mastered? We see an increase in the number and functionality of business models that use information systems that cross organizational boundaries, such as systems linking one or more firms with customers and/or suppliers. New business models appear or old business models advance and undergo renaissance. Nonetheless, they all have a very short history and still need to prove and justify their efficiency and functions. So why not instead ask the question: Which competencies must a business model, in current digital transformation, manage to face its concurrent in respect of the "supply chain versus supply chain"? One of these business models is a "B2B electronic marketplace" (EM), which this document is going to deal with. This document, based on the proposed framework by [1], examines the literature and proposes some directions for future research. The organization of this paper is as follow: Section two details the methodology of our research. Section three provides a survey of the EM discussion and presents an EM definition. In section 4, we reveal the importance of supply chain management within the electronic marketplaces. Finally, in section 5 the relevancy of supply chain management for an EM is analyzed by reviewing the type of relationship within different electronic marketplaces categories.

2. Methodology

A generally established literature review was carried out along with definition of key words research on the World Wide Web. The investigation included international journals as well as reports from smaller journals, conference papers and the "grey" literature (i.e., popular articles, unpublished reports and other documents, and some online non-journal materials). First, relevant keywords, such as "digital economy", "electronic marketplace", "electronic SCM", "electronic exchange", "electronic auction" were defined. Then, a search in electronic scientific databases, internet portals and websites of relevant consultant and research firms was conducted; various search engines were used.

3. Electronic Marketplaces

3.1. Issues on Electronic Marketplaces

E-commerce means the actions of buying and selling of goods, products and services over the internet. E-commerce is alternatively referred to as online commerce or internet commerce. These services provided online over the internet network. Electronic commerce can be classified into four main categories depending on the types of parties involved in the transactions and exchanges. Thus, the basic electronic commerce models can be classified as follows:

3.1.1. B2B (business-to-business)

Transactions only involve the manufacturers, wholesalers, retailers etc. For instance, a construction product company sells its products to architects and designers.

3.1.2. B2C (business-to-consumer)

Businesses that sell their products or services directly to the consumer. This is the frequent type and there are thousands of examples of clothes, shoes or electronics stores (for example Amazon, Zalando etc).

3.1.3. C2B (consumer-to-business)

Sites in which consumers offer products or services and businesses; particularly it refers to the traditional websites for freelancers such as Freelancer, Twago or Adtriboo.

3.1.4. C2C (consumer-to-consumer)

Businesses that facilitate the selling of products amongst consumers. The clearest example is eBay or any other second-hand website (for example OLX).

Other categories are sometimes used: (B2G) "Business-to-government" describes transactions for selling products, services or information between private firms and public agencies or departments (or also G2C (Government-to-Consumer) and G2G (Government-to-Government). The network is now largely used by government organizations throughout the procurement process at local and national levels.

As e-commerce continues to evolve, one more important business model has been developing for these last years, called mobile commerce, also known as "mobile ecommerce" or "m-commerce". Mobile commerce means commercial transactions and communication activities conducted through wireless communication services and networks which enable users to buy or sell products or services from almost anywhere, simply using a smartphone or any other mobile devices.

M-commerce is considered by some experts as the next generation of E-commerce. Mobile commerce is a rapidly growing part of e-commerce. In 2017, Statista.com reported that m-commerce represented 34.5% of all e-commerce sales in the United States. Experts believe that that percentage will reach 53.9% in 2021. At another point, mobile commerce can be categorized in three different types of transaction, namely: mobile payment, mobile banking and mobile shopping.

In accordance with the survey of the World Advertising Research Centre, almost three quarters (72.6%) of Internet users, equivalent to nearly 3.7 billion people, will access the Web solely via their smartphones by

2025. Hence, Mobile commerce is expected to represent a vast majority of people who prefer experiencing the full spectrum of the buyer's journey through smaller screens in the future.

Nevertheless, many of these electronic markets have been established on the internet since the middle of 1999. The Economist newspaper estimates that there were over 750 electronic marketplaces in the world in the beginning of 2000 (The Economist, 2000).

The EM concept, however, dates back to mid-1940s when the first documented EM system, known as Selevision, was used to remote-market Florida citrus fruit [2]. Real developments in EMs, however, only started in the late 1970s when the first computer-based EM pilot project was initiated [3]. During its history, the core function of the EM facilitating trading transactions for buyers and/or sellers has remained. It seems that only innovation has been the medium underlying the market mechanism, which has been developed from analogue telephone systems to digital computer networks.

At the end of 2000, many European and American business companies provided their services through the internet. Since that moment, all the people started associating a word "E-commerce" with the ability of purchasing different products via the network using secure protocols and electronic payment services.

Nowadays, since new entrants with new business structures enter into the B2B area, it is progressively difficult to conceptualize the new electronic markets landscape. Due to the digital transformation, EMs became an important issue for both researchers and practitioners because of its limiting factors of time and space. Via the internet, electronic markets are ubiquitous and available 24 hours a day ([4]; [5]). They seem to be more "just" and "self-ruled" as well as more competitive and decentralized ([6]; [7]). Following these arguments, Ems could be considered manifestations of the neoclassical market ideal, reducing transaction costs to a negligible minimum ([4]; [8]). New EM viewpoints have grown and its research is popular in a range of disciplines, though definitions are varying, attributes and characteristics seem to be innumerable and used arbitrarily (see Table I).

Is an EM an interorganizational information system ([8]), an electronic procurement solution ([9]), a medium ([10]), a meeting point ([11]), an intermediary ([12]) or just a listing ([13])? Beyond that, some authors argue for special attributes such as virtual ([9]), digital ([12]), public ([13]; [14]), neutral ([9]), or open ([3]). These examples show that the vocabulary, which is used to describe this new area of business, is always under establishment. Within the "e-hub name game" ([15]) the name EM barely prevails against other terms and concepts like B2B marketplaces, e-hubs, e-markets, exchanges, auctions, portals seem to overlap and mean different things to different people.

Although a huge research on electronic marketplaces (EMs) has proliferated in recent decade, related definitions or classifications are still confusing. In the following section an attempt is made to set out a clear definition of an EM.

Author	Selected EM definitions
[3]	An EM divides the negotiating functioning from the physical transmission of the product or service in which the
	market deals. It can direct the sellers' and buyers' offers and bid proposals, together with shipping products directly
	from sellers to buyers. This system is open to all sellers and buyers, despite their location.
[13]	An EM can be considered serving as a public listing of goods and their attributes from all suppliers in an industry
	sector, and accessible to all eventual buyers.
[4]	An EM is a media which arrange the market-based exchanges between agents in the whole transaction process.
[10]	EM represents a respectively neutral position amidst seller and buyer, furnishing services to both parties. An EM
	represents a virtual space where buyers and sellers get together to exchange products and services.
[11]	Section titles, tables, table names, first letters in table captions, figure captions, footnotes, text subscripts, and
	superscripts
[12]	EM is a meeting point where sellers and buyers can collaborate online.

Table 1. Selected EM Definitions

3.2. An Electronic Marketplace Definition

A marketplace as a historically evolved institution allows customers and suppliers to meet at a certain place and at a certain time in order to communicate and to announce buying or trading purposes, which finally can consort and be arranged. Today the institution market still does the same, but it has been remodeled due to the evolution of Internet technologies and business practices. Businesses, consumers or even governmental agencies take advantages of new internet technologies to build their electronic commerce strategies in order to increase profitability, improve customer service and deliver products faster etc. Owing to the evolution of modern information and communication technology, time and space restrictions have been weakened and the cyberspace has become the new meeting point. Today buyers and sellers meet in cyberspace rather than physical place. In simple terms, E-commerce does not involve face to face contact between the businesses, customers etc.

The single characteristic feature of an e-market is that it brings many purchasers and sellers together virtually in one central market area. It also enables them to procure or sell from each other at a specific price which is established with respect of the exchange rules, which is called an electronic exchange. The important point, which differentiates an exchange from other B2B e-commerce companies, is that an exchange involves multiple buyers and sellers and it centralizes and matches buy and sell orders and provides post-trade information. One should compare this with the e-procurement process of one company, say General Motors, which sets up a web site with an auction process for suppliers to bid on contracts with General Motors. This is not an EM because there is only one buyer. In a similar manner, a company that offers goods or services for sale to other company through the network, is not an electronic market even if it gives a price-setting principle that is normally related to an EM, such as an auction because there is only one seller.

Another important feature of EM is the universality. The electronic transaction for buying and selling anything take place through websites, that can be accessed from anywhere around the globe at any time. Any company establishing a Web presence, no matter how small it is, automatically enters global e-market. The web sites can be observed by anyone with web access. The developed infrastructure, namely the international credit cards (e.g., Visa) and international delivery systems (e.g. UPS, DHL) enable the company to realize the electronic trading. In view of this, global market development becomes a reality for many firms, irrespective of their size and geographical location [16].

To summarize these thoughts and show different views ([17]), an EM could be defined as follows:

3.2.1. Institutional as a medium

- that assigns different roles within a community, primarily buyers and suppliers, but also other roles like logistics service providers, banks, and other intermediaries;
- that facilitate the exchange of information, goods, services, and payments;
- that provide an infrastructure: define protocols and processes that rule the inter action within the community, and also provide a common language.

3.2.2. Social as a community consisting of buyers, sellers, etc.

- which could be described by a certain condition, which includes the participants knowledge, intention, contracts (assets and liabilities) and goods, at a certain time;
- with roles involving rights and duties;
- which intends to use market transactions exchange or communication procedures in order to change their condition according to their intention.

Currently, with the rapid growth of e-commerce, the EM from legal and tax standpoint has become a serious issue for governments, notably in the U.S. and the European Union systems. As it is mentioned by [18], this new electronic boarder has developed from its fledging period to an economic leadership in such a

considerably short moment so that the legal structure absolutely has not had enough time to take up.

In these past years, consumers have also become considerably mindful of who is accessing, collecting, receiving, storing or processing their personal data. With the aim to control the data protection requirements and improve trust in the rapidly expanding digital economy, governments have enacted laws as for example the EU's General Data Protection Regulation (GDPR) and California's Consumer Privacy Act (CCPA) [19].

4. Supply Chains and Electronic Markets

4.1. Why Electronic Markets Need to Proceed

Most of our studied authors believe that electronic marketplaces will eventually prevail over the B2B sector. Nevertheless, once you overstep the boundaries, you will quickly realize that many electronic marketplaces are experiencing the difficulties getting a large number of users or members, a long product list and many different offers on the websites for sale or purchase requests. The total amount of transactions conducted, however, is much smaller than the number of users.

Ref [20] points out three major drawbacks in electronic markets: first, it is the value proposition that provides competing transactions between suppliers, enabling buyers to get the lowest price. The latest thoughts on supplier-buyer relationships are considered as positive. In a broad sense, the market has an unlimited number of anonymous members, excellent information transparency, and present business struggles in respect of its dynamic prices ([21]). Despite this fact, this scheme optimizes resource allocation to guarantee maximum economic benefits, which is also remarkably unreal, as it brings the company's profit margins which are equal almost to zero. Other different features such as quality, delivery time and customer personalization in many circumstances are more essential than price in establishing the total value presented by a supplier. Numerous companies have spent many years in operating their supply chain connections and/or in constantly building stronger and strategic relationships with their suppliers; many of these partnerships have involved work alliance product design, incorporation of complex operations and sustained service agreements and contracts ([20]). Second, [20] point out that electronic market provides minor benefits to sellers. According to these authors, suppliers can attract more buyers with only insignificant raise in marketing expenses, although this gain is overbalanced by pricing tensions. Small numbers of suppliers are willing to become anonymous competitors in stern bidding struggle, and for the most significant quality and for the most inventive suppliers; the price struggles are anathema. Eventually, the business process models of many electronic marketplaces can best be described as inexperienced. Their ambitions to get wired companies that control the electronic marketplaces have neglected the moment to investigate their customers' preferences carefully in order to build special offers or even set up efficient strategies.

Apparently the most imperative issue is whether technology or electronic marketplaces itself enhances antitrust questions. Susan DeSanti, Policy planning director of the Federal Trade Commission in Washington suggests that there are always purchasing business ventures between competitors, so there is a clear possibility to enhance the antitrust questions ([22]). The opposing sides observe what other companies execute or practice, taking advantage of this new electronic technology and transferring their standard operating process into innovative practice that was previously used to be achieved through written documents, via telephones or during personal sessions ([22]).

Since 2000, the anti-trust issues and namely the cyber security of businesses, government agencies and consumers have greatly improved. Thus, two government agencies: The Federal Trade Commission and the U.S. Department of Justice issued a policy on cyber security information sharing and stated that properly designed cyber threat information sharing will not possibly raise antitrust concerns and it can provide

input in securing the nation's networks of information and resources ([23]).

In spite of this, the substantial issues have still maintained. More precisely the question is whether the era of new technologies will go forward facilitating direct connections between supply chain members, as for instance manufacturing companies and final consumers of goods or just businesses and their suppliers. However, despite this fact, many academic specialists define the supply chain management as strong indispensability for the electronic marketplaces. Their arguments will be studied in the next section. Since 2000, the anti-trust issues and namely the cyber security of businesses, government agencies and consumers have greatly improved. Thus, two government agencies: The Federal Trade Commission and the U.S. Department of Justice issued a policy on cyber security information sharing and stated that properly designed cyber threat information sharing will not possibly raise antitrust concerns and it can provide input in securing the nation's networks of information and resources.

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4.2. E-Supply Chain Management

4.2.1. Theoretical point of view

Theoretically, the interactions between the electronic marketplaces and logistics management are known to be as problematic. Cooperative supply chain is intended to decrease the number of suppliers and establish a long-lasting strategic cooperation that fix suppliers and block any competitors, at the same time as the electronic market promotes competition challenges and enables the buyers to seek out the suitable suppliers and maintain transaction-based partnering relationship.

The economies have two essential characteristics for coordinating the circulation of goods or services between adjacent stages in the market's value chain and its ranking ([7]; [8]; [24]). [25] divides transactions into those that keep the coordination amongst various buyers and sellers, namely, the market transactions and those that support intra-company coordination along with the production value chain, namely, ranking transactions ([25]). [25] underlines that the choice of transaction is based on many elements, involving the particularity of the asset, the interests of both parties in the transaction, and the uncertainty and ambiguity in the exact description of the transaction.

The electronic market theories proposed by [7] suggests that with all other conditions being equal, the introduction of information technology will establish a larger use of markets as opposed to hierarchical structures of economic transactions. The lower stages of these two elements, the specificity of the services and the complication of description, will prioritize the market, rather than the hierarchy of a specific industry.

Remarkably explicit assets are most probably to be obtained through hierarchical interrelation rather than market coordination. Transactions that consist of specific products generally require a long development and adjustment process for supplier companies in view to satisfy the buyers' demands, a process that gives preferences to continuity in the hierarchy ([7]).

Products with substantially complicated description are most probably to be obtained through hierarchical coordination as the transaction costs correlated with exchanging complex descriptions. In the market, these complex descriptions should be achieved from various possible suppliers in order to have the correlations. As a result, purchasers of products with complex descriptions will most probably deal with a single supplier in close hierarchical relationship. Nonetheless, some experimentalize studies concentrating

on the inter-organizational structures to the extent of the supply chain have demonstrated that they actually generated the hierarchical coordination ([26]).

Another argument is the theory suggested by [27]. These two theories have been extensively reviewed in electronic markets by different authors (as for example [28]; [29]).

The question of whether electronic marketplaces and supply chain management are compatible is in fact the issue whether the electronic marketplaces are progressing to bombinated structures in the extent of the market-hierarchy continuity ([25]) so as it was suggested according to the theory of [27].

For many years, there always has been an increasing interest by the different researchers in respect of the compatibility or incompatibility of the supply chain management and the electronic marketplaces or simply the internet.

In accordance with the definition of [30] in respect of supply chain management, the electronic supply chain management is defined as an effect that the Internet has on the assimilation of major business operations from final user through initial suppliers that supplies the products or services, and information that provide value for customers and different stakeholders.

Hence, the electronic marketplaces and the supply chain cannot exist on their own today. The supply chain management is the key issue to be solved by many Operations managers all over the globe. There are several important influences of the internet on the supply chain management. One of the most important issues is the impact of e-commerce, which relates mainly to how companies can react to the significant challenges set by the Internet on provision of goods sold through websites. Another influence deals with the information sharing, namely how the network can be used as an instrument to approach and transfer information across the supply chain members. On the other hand, the network not only enables supply chain members to access and distribute information, but more specifically access data statements and modelling to mutually create a better projection and planning as well as decision-making process. This mutual planning and decision-making process is the third type of influence of the Internet on SCM [31].

In other terms, there are many benefits for electronic businesses with regards to supply chain management: it enables the e-business to reduce some supplement costs, improve their service, enhance a customer satisfaction, retain competitive advantage, etc.

4.2.2. Logistical point of view

From a logistical perspective, electronic marketplaces and supply chain management are not only compatible: electronic marketplaces to a considerable degree depend on supply chain management.

[32] points out that today, each company engages in competition in two markets: the marketplace where the means and goods stand physically and the market area, a virtual scope of e-commerce, where the main purpose of transactions is information. The management of these two interactive value-added processes in two interdependent areas are considered as new concepts and strategic challenges for each company.

[33] claim that the marketplace is an element of the online relationship in the supply chain that can be split into three business perspectives: particularly business-to-consumer, business-to-business and market space. In this circumstance, the market space engages the company, its partner members and its customers and it offers the possibility for elaborating communication exchanges, involving customer studies and the information share on product guarantees and service capacities. In addition, it is suggested that as the market space reforms regular value offers, supply chain management is required to manage the organizational difficulties, more precisely, assumption of dynamic offerings and emphasis amidst context, composition and functionality. Incorporation of the supply chain into a virtual market is likely viewed as a mixture of formal and indefinite integrated mechanisms, which is similar to the network functionality.

But the question is whether physical logistics and online transactions are competing or mutually reinforcing. [34] assert that electronic commerce cannot exclude the necessity for logistics process;

practically, it even raises their significance. The information flow between supply chain members can be effectively regulated through the network, which can help to decrease the costs and improve the speed and quality of data transmission. On the contrary, electronic markets should arrange an additional physical logistics process to deliver various products to their customers. But still this is realized ineffectively. [35] states that the e-commerce dimensions of supply chain are mainly omitted and mismanaged, whereas in contrast poor logistics performance is presently extremely hindering the turnover and income of electronic commerce functions. In case if basic operational performances cannot be guaranteed, more advanced methods of electronic business will not develop successfully due to insufficient support for concepts in the physical area.

The ultimate goal of the e-commerce logistics supply chain system is to satisfy the un-limitedness of the online transactions as much as possible through the limitation of physical resources. From the perspective of the existing logistics entity resources of e-commerce, there are currently four main matching areas, namely: warehouse, inventory, distribution scope, and category. Hence, the specific issues have been raised:

- Inventory issues. The expansion speed of physical logistics warehousing is far from meeting the e-commerce sales inventory requirements.
- How is the inventory of warehouse logistics distributed? Inventory turnover is basically not ideal from the current online sales.
- The breadth and depth of distribution. Most of the second- and third-tier cities in China rely on third parties to cooperate, with unsatisfactory results.
- Solve the problem of distribution product characteristics. For fragile, cold chain insurance, irregular packaging, and oversized items, the distribution of these products is also a big contradiction.

In other words, there are two issues that need to be adjusted:

- Is the warehouse and inventory are always limited?
- Is that the depth of the distribution network is limited?

From the perspective of the integration of the entire market, the first is to integrate supplier resources, and the second is to integrate distribution network resources.

In addition, [36] point out that electronic markets can outsource the functions of physical logistics processes to other professional companies. It can be considered that the creation of network is reforming the structure of traditional distribution channels, which is conducive to the professionalization of logistics functions. The authors defend for establishing a value networking, where the electronic market is arranging and operating a difficult mix of partnerships with physical logistics service suppliers. On the contrary, in many situations, the electronic markets will decide to establish its private physical services with the aim to provide a stable product delivery quality. In opposition, [37] set up a model that includes all participants in the value chain linked to the national information roadway. This roadway includes both the transportation of physical materials and information, and it links information makers, physical manufactures, online retailers, electronic markets, physical logistics networks, electronic channels and mailboxes. Apart from that, they believe that all stakeholders in the industry's value chain need to determine whether their position in the value chain is under threat and, in that case, they should implement long-term strategies for testing. Members of the consumer value chain need to recognize the conditions under which consumers are more willing to buy from single-source suppliers and electronic markets.

[38] defines the process for carrying out B2B biddings via the Internet and raises general questions, possibilities for process improvement, and interpretation of bidding results, while [39] form a concept for electronic markets in respect of logistics. [38] believes that electronic auction is a smart technical solution to reduce costs; however, it does not completely help detect the basis and reasons that create poor costs

management at buyers' side. In addition, the terms and conditions of the contract practically demonstrate that intermediaries are very knowledgeable about product management, markets, and information technology; however, they do not understand well the supply chain management and lean manufacturing. Therefore, the author suggests that electronic auctions will postpone the introduction of modern supply chain management principles and the implementation of lean manufacturing that should be performed by suppliers and buyers with the view to properly exclude wastes and decrease overall costs.

Conflict of Interest

"The authors declare no conflict of interest".

Author Contributions

In this paper, Shynar Murat and Panpan Huang conducted the research; Atour Taghipour supervised the research. All authors had approved the final version.

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