E-commerce in the era of IoT

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Abstract: E-commerce has developed due to the fulminate evolution of ICT, but also due to social factors, policies. There is a tight interdependence between these factors and E-commerce. It enabled the development of new business sectors, creating new jobs, globalizing the market, raising the quality standards of products/services and customer expectations. All the modern companies have to keep up with technology. The paper analyzes the evolution of current technologies and makes important recommendations for modern companies in order to meet the expectations of a very competitive business environment and sophisticated clients.

Keywords: IoT, E-commerce, Hype Cycle for Emerging Technologies, Halo Effects, Pick-up and Drop-Off

JEL classification: M15

Introduction

E-commerce is one of the tools used by internet focused businesses to make electronic payments and to transfer the right of using or owning goods or services from one person to another. In this context, e-business represents any business between different partners, customers, public administration, deployed in the on-line environment.

E-commerce is the consequence of the development of information and communication technologies (ICT), the increase in the number of Internet users and the trend towards the Information Society, being the consequence of using information and knowledge in conditions of increased protection of the environment in accordance with the objectives of sustainable development. In many specialized papers it is stated that it is impossible to predict the dynamics of ICT changes in everyday life and business activity, technologies evolving from day to day, impacting on human thinking.
With new technologies come new products - digital products / services - as a result of the easy accessibility, storage and transmission of digital information - and new economic activities (such as hosting websites, on-line etc.).

Due to the globalization allowed by the expansion of the use of the Internet, products and services have to be increasingly competitive, responding to more complex and evolving needs. The Internet brings many opportunities for companies that choose to grow online, such as superior exploitation of value creation, expanding on new markets, launching new products / services, brand consolidation, revenue growth, real time feedback from consumers, on-line payments, public service computerization, but it also brings threats of security breaches (which may affect the protection of privacy and personal data, confidentiality of transactions, consumer protection etc.). The Internet also led to the emergence of the "digital divide" phenomenon (the exclusion from the benefits of new technologies of some social categories and geographical regions), to social cohesion problems and to issues related to the preservation and promotion of the specific culture to each nation and local communities, being necessary to protect the citizens and the consumers.

1. Literature review

In its evolution the Internet had different features. It originally offered content (www - used to publish and share content), then services (web services, collaboration tools and online commerce), then it addressed to the people (social media due to the proliferation of smart phones and tablets) and nowadays is heading for communications (machine-to-machine), also called "Internet of Things" (IoT).

![Figure. 1. The evolution of E-commerce](image)

E-commerce has evolved from version 5.0 in 2010 to version 7.0 in 2012 and Internet of Things in the present (Fig. 1).

Version 5.0 referred to the use of Windows Azure Support technology, the use of SEO tools, creating customer loyalty by using mobile interfaces that can be viewed from tablet and phone devices, support for distribution and use of customer preference lists.

Version 6.0 was about improving on-line self-service, complex analyst integration, Microsoft services and touches screen functionality, support for different currency within the same online store, and integration with tools like SAP ERP.
Version 7.0 covered advanced personalization, channel integration, mobile enhancements, access to partner portals, time-to-value conversion, multilingual support within the same online store [Gubbi, 2013]. This trend is currently preserved, but we are moving towards IoT, that boosts the benefits of new technology and easy communication.

Though experts in the prediction of the future have talked about intelligent refrigerators and autonomous cars over the last decades, the current market and technology are moving towards the Internet of Things. IoT brings different advantages [Jadoul, 2015]:

1. Lower costs for hardware and access to mobile devices.
2. Proliferation of mobile devices and M2M endpoints to create a customer base and deploy new applications.
3. Low-energy wireless technologies such as RFID, Wi-Fi, ZigBee, Bluetooth, etc. allow for the payment or remote control of everyday activities from anywhere in the city, from the car to the office and so on
4. New types of data analyze by combining old methods with IT algorithms and tools.
5. In most developed countries, the market for communications devices and services is almost saturated. It tends to machine-machine communications, which offers opportunities for the introduction of new devices and new services on the market.
6. Consumers are becoming more intelligent and are looking for new services and applications to enrich their lifestyle, work environment, new ways of transport, shopping and health care and the environment.
7. Networks of SMEs, businesses, utilities and public administrations have to face the challenge of in-real time interaction with their customers, suppliers, and partners.

Figure 2: Top Trends in the Gartner Hype Cycle for Emerging Technologies, 2017, Source: [Panetta 2017]
The study presented in Figure 2 reveals that in the next 2 to 5 years the general trend will be evolution of technologies such as Serveless PaaS (Cloud Computing – Platform as a service), Augmented data discovery, IoT platforms, Deep and Machine Learning, Cognitive Experts Advisors, Software -Defined Security and Virtual Reality.

A forecast for 5 to 10 years talks about Deep Reinforcement Learning, Neurometric hardware, Digital Twin, Smart Workspace and Robots, Virtual Assistants, Connected Home, Cognitive Computing and Augmented reality.

For more than 10 years a forecast reveals technologies such as Smart Dust, 4Dprinting, Quantum Computing, Volumetric displays, Brain-Computer Interface and Autonomous Vehicles.

At a glance we can say that some of the expectations will not be met, but of all these technologies, Augmented Reality and Virtual Reality are very powerful instruments that can be used businesses. They support the implementations of Pick-up and Drop-Off (P&D) outlets, postboxes, touchpads, QR code shopping, Halo Effects, etc.

In Europe, 3 out of 4 people have internet access and spend more than 30 hours per month online. One third of online time is dedicated to content sharing and socialization within social networks [AD, 2017]. People are becoming more comfortable and prefer the protection of an IT device than meeting people. Also, online shopping is not among their preferences, because of the lack of trust in data security on the internet and the inability to test products. At the same time, for some people, shopping at market is a pleasant form of leisure.

IoT has become a powerful force for business transformation. Its disruptive impact will be felt in all industries and all areas of society.

**Forecast of online sales share in 2020 and impact on retail sales footprint**

![Figure 3: Forecast of online sales share in 2020 and impact on retail sales footprint [source: Kesteloo, 2013]](image-url)
Figure 3 reveals that sales of toys and games will increase in the future by 33%, clothes by 20% and electronic devices by 17%. We also see a continuing concern to protect the environment, especially in companies that produce electronics, reducing the impact on environmental footprint by 41%. This impact is also reduced in the case of clothes by 25%, which implies, in particular, the use of recyclable or biodegradable materials, the reduction of energy consumption, the reduction of sales areas and the migration to the online environment.

2. Recommendations for companies in the era of IoT

Companies can opt for medium-sized virtual showrooms: there are shops that have a digital touch through touch-screen walls and other devices. This format allows merchants to display their full collection on a limited space, which is especially attractive for big box retailers and car brands because it offers them a way to enter urban areas. An example is Audi, which plans to open twenty Audi City shops that offer the experience of virtual reality in the coming years. For customers, virtual showrooms provide the benefit of experiencing a personalized product, to their taste and needs (such as a car, kitchen or shoe, all personalized). An additional feature of virtual showrooms is the high degree of connectivity with the social network of customers, providing a perfect on-line and off-line purchasing experience. The initiators of this trend are automobile manufacturers and clothing traders, such as American Apparel, Adidas, John Lewis and Marks & Spencer [Kesteloo, 2013].

Another solution is the development of Pick-up and Drop-Off (P&D) outlets designed to overcome online shopping barriers, respectively the payment of transport costs, as well as the inconvenience of fixed delivery windows between “8 am and 5 pm”. These are small local stores in high traffic areas or highways (railways or gas stations), warehouses, neighborhood supermarkets, or even postboxes, and street-type mailboxes (DHL) in malls (for example De Buren) or in urban centers. The format can be a customer service store, a drive-through concept, or a wall with cabinets and codes.

We can also mention the touchpads on the restaurants tables (Inamo), which facilitate the customers to order the desired products.

Other retailers, such as Diesel, Adidas and BoConcept (furniture), experience the QR code shopping window to give customers the opportunity to connect to a particular promotion or event or to provide additional information about the products displayed.

The "Halo Effects" of interactive technology changes the role and experience of the physical store. Advanced mobile technologies (online payments, virtual reality) will allow consumers to scan and buy everything they see in real life. Mobile devices are more than just communication tools nowadays. Globally, smartphones and tablets contribute to an important percent of users’ traffic on e-commerce and travel websites [Shiju, 2013].

Companies and users must take these characteristics into account and define appropriate strategies so that they can take advantage of this opportunity. In other words, a company that has access to social networks where members are permanently connected can show different offers, learn their preferences, habits, and respond with dedicated services and products.
In this regard, businesses need to consider implementing an e-commerce solution to respond to customers who prefer the virtual environment. In the first stage, the company can choose to implement an online payment facility, such as PayPal or NoChecks, so they can pay directly with the card. These solutions allow the integration of a button on the company's website, through which customers are redirected to another payment processing site. This site mediates transactions and completes the client's return to the company's original site. Thus, the company wins time and eliminates issues related to electronic payments, focusing on achieving its own goals.

In the second step, the companies can opt for a site that integrates the shopping cart, allowing customers to check if the product is available, set up an account, and set up recurring payments. In this case, the companies can opt for an integrated e-commerce solution like Magento or Shopify to integrate product search tools, inventory, customer account management, or order management. The companies can use a solution such as Squarespace, which also allows you to personalize the page with thanks, adding offers for the product you buy. This also involves significant costs, but it also allows for information about customer preferences and the triggering factors that triggered the purchase.

A free solution for managing ad campaigns (for a small number of customers) and online consumer behavior analysis is MailChip.

The objectives of the companies are dynamic. When it comes to the opportunity to manage an online store, the companies can choose Shopify, Volusion, Magento, OpenCart, etc. Some are free of charge; others are not and offer a wide range of functionalities. More specifically, clients can make accounts that allow for personal information to be collected, a coupon discount system can be integrated, all orders flow can be tracked etc.

E-commerce can be deployed by off-line companies that decide to expand online or adopt a rebranding strategy, or companies that are dedicated to online business, often offering digital products or products and services that lend themselves to on-line sale (software, music, movies, flight booking, holiday, concert tickets, consulting services etc.).

Companies that have to sell products that need to be tested, palpated, tried out have to make additional efforts to present them through pictures, descriptions, but especially by short films (120 seconds) and by satisfied customer recommendations and testimonies.

In the next step, the companies can choose to market products on sites like Amazon or eBay, which are based on an e-commerce solution that support multi-channel sales strategies.

The business environment exerts important influence on the decision making process. Some of the restrictions can be minimized or turned into opportunities. Thus, some competitors can be turned into partners. Competition may be reduced if new strategies are adopted or the expansion is extended to new niches created by the economic and political context. Globalization brings the advantage of expanding to global markets, especially through the Internet, but at the same time it is associated with increased competition and quality standards for products and services. Globalization and the expansion of Internet services have led to the adaptation of companies' behavior to the new context: emphasis is placed on information and feed-back. There are also cases
where rapid feedback has unfavorable consequences, such as brand damage or the choice of an inappropriate supplier or the choice of erroneous strategies that can lead to economic losses. To mitigate these negative effects, companies can base their decisions using BI (Business Intelligence) applications. Of course, such an approach usually requires a serious investment, but there are also less costly solutions - a search on Internet can reveal some free solutions. However, free solutions have disadvantages: the effort to understand and adopt them is not to be neglected. These factors add to the human component, such as the degree of economic and technical culture of BI users, the extent to which they accept new technologies, their ability to analyze and synthesize.

“E-commerce will drive Core Competency of the organization to the optimum level; and Satisfactory Performance in business deliveries will facilitate more potential access to variety of markets, where the product or service is perceived by the consumer as best satisfying the needs compared to any other competitor by achieving cutting edge performance in marketing” [Umachandran, 2017].

Conclusions

Modern companies had to keep up with the technology trends. They have to provide Artificial Intelligence services (deep learning, autonomous vehicles) at the consumers’ hands. They have to provide novel experiences (4D printing, augmented reality, mobile interfaces, connected home) for the very good informed and sophisticated consumers. These services and products can be offered through digital platforms (5G, IoT platforms) that allow M2M and M2C connection, resulting in a competitive business ecosystem.

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