Digital Ecosystem and How It Can Benefit the Business: A Narrative Review

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This article discusses the concept of Digital Ecosystem and how it can benefit the business. The Digital Ecosystems vision is a relatively new concept in the field of business research initiative, and much work remains to be done to establish it. The methodology used was the narrative review that identifies what was written about a topic or topic. The complexity aspects that appear in the Business Ecosystems are: self-organization, emergence, co-evolution and adaptation. Finally, the article provides a brief introduction to Digital Ecosystems and focuses on the reasons and advantages for Digital Enterprise Ecosystems.

1. Introduction

From the development of Information Technology (IT) in the data production and storage branches it was possible to verify some basic aspects related to the administration of the same and their effective exploitation. From this context, Disner (2014) contextualizes that due to the use of computer systems, a huge amount of data is generated daily, whether through user action records, social networking posts, and transactions made in business systems. Therefore, it is important to analyze these Digital Ecosystems to assist in the business decision-making process.

In this scenario, Hurwitz et al. (2015, p.11), describe that data management can be defined in three related phases, since each one evolved due to the cause and effect of the other.

In Phase I, the 1960s and 1970s, one can observe the development of the relational model, the Structured Query Language (SQL). However, when the volume of unstructured or semi-structured data that organizations needed to manage increased wildly, it became necessary to develop object-oriented database administration. In Phase II, in the 1980s and 1990s, with the emergence of the web, a more unified model was needed that would serve both types of platforms, with the emergence of systems for metadata. But even in this wave, organizations have identified the need to manage a data source containing a quantity and variety of data to be processed at high speed.

Thus, in Phase III, Big Data is developed, which represents the ability to manage a huge amount of data from different sources, at the right speed and within the time frame to allow real-time analysis and reactions.

As a result of this evolution of resources and tools associated with Information Technology, the development of Digital Ecosystems is identified. That is, Dorner and Edelman (2015) see "digital" as the use of digital technology to create value in new markets, new value in core businesses and the development of fast and agile companies.

That said, according to Lopes (2016), the combination of process automation, data integration, and innovative analytical capabilities are radically changing the way companies work as new technologies have given large corporations geographic independence.

Thus, the objective of this work was to conduct an exploratory research on Digital Ecosystems and how they relate to the decision-making process in the business. In addition, from this exploratory study, we sought to know the subject in greater depth, in order to make it clearer. Finally, considering the above, this set of research evidences the relevance of studies for research on Digital Ecosystems, especially for enabling mechanisms for business decision making.

2. Method

For the development of this study, theoretical reviews of the literature were carried out. For this, according to Pare et al. (2015) an objective theoretical review develop a conceptual framework or model with a set of propositions or research hypotheses and can usually begin with a broad review question that is often refined as more evidence is collected and analyzed. Therefore, since the objective of this study was to systematize the
search for scientific production regarding the use of Digital Ecosystems, the question for which answers are sought is: how has Digital Ecosystems studies been developed?

Through an exploratory study, we sought to know the subject in greater depth, in order to make it clearer. Gil (2002) emphasizes that exploratory research is developed to provide an overview of a given fact. Reis (2008, p 55) still highlights some important purposes of exploratory studies, such as: to bring the researcher closer to the subject and object of study; construct important research questions; provide an overview of a particular fact or problem; to deepen preliminary concepts on a given theme; identify a new aspect about the topic to be researched; and make possible the first approximation of the researcher with the subject of study, regarding the analysis of examples that stimulate the understanding of the researched subject.

In this way, exploring the subject means gathering more knowledge, as well as searching for new dimensions that were previously unknown, seeking to provide a familiarity with the problem in order to make it more explicit, being the main objective, the improvement of ideas or the discovery of intuitions, allowing the consideration of the most varied aspects, related to the fact studied.

3. Digital Ecosystems

For Blanton et al. (2017), digital business models are related to globalization due to the demand for integrated services. In this scenario, the importance of the development of Artificial Intelligence (AI) is observed due to its role of facilitator of the ecosystem and also the opportunities with relationship management and results within the established time and within the budget.

This highlights the importance of governments in encouraging the development of AI, not only for defense and intelligence agencies, but also to improve business efficiencies with robots, machine learning, and virtual customer service technologies.

Razavi et al. (2014) describe the need for the relationship between the Business Ecosystems and the Digital Ecosystems because we live in an interconnected world that since 1830, with the invention of the telegram, we observe the reduction of distance and the opening of new markets.

This development enabled manufacturers and producers to increase production capacity, which in turn led to the development of these companies. In this scenario, since the twentieth century, it has been seen that the Internet has created opportunities for new small entrepreneurs, SMEs as well as large established companies. Thus, it is realized that the goal of any business network is to enable organizations to engage in business interactions (transactions) in order to carry out their main business activities.

Thus, due to this need to provide a new model, concept and definition, the research community, organizations and governments have begun to propose a new conceptual framework for Digital Ecosystems, such as the Corporate Digital Ecosystems model proposed by Nachira (2002) in relation to SMEs. That is, this conceptual framework tries to solve the current challenges of the companies since it promotes a modern and dynamic network to support the business interactions. Finally, the authors point out that, in addition to the benefits to the new era of Information Technology, digital development can affect different aspects of society.

In this same scenario, Pattinson and Johnston (2015) point out that, just as a Digital Ecosystem adopts a holistic view of entities, activities and events mapped for the purpose of assessing sustainability in the geographic location attached to it, Digital Business Ecosystems also need to consider the main challenges and issues related to B2B (business-to-business) as the interactions developed by the digital processes in marketing.

Thus, to highlight this relationship, Pattinson and Johnston (2015) described the flow set forth in Figure 1 which describes that the B2B Digital Business Ecosystem contains three layers, including: the Internet of Things (IOT), a collection of intelligent sensors that collect and send information in real time over the Internet; Big Data, referring to analysis of large data flow inserted in an environment of high volume, variety, speed, truth and value; and Information Services Platform, that is, the use of digital technology to create new value in new markets and the development of fast and agile companies.
In relation to Big Data, Nimmagadda et al. (2017) developed a Digital Ecosystems foundation from the perspective of Big Data. That is, since data visualization can add value to the knowledge of existing ecosystems, they can allow exploring and investigating the connectivity between the various data patterns and, consequently, ecosystems.

In this scenario, through the integration of multiple ecosystems (human-environment-economic), it was possible to identify that the exponential growth of the human ecosystem and the technological advances that facilitate the increase in the demand for resources radically changed the relation of these ecosystems over the last three centuries. Thus, the applicability and feasibility of integrating multiple ecosystem data into an environment of storage, mining, visualization and interpretation of such data has an impact on ecosystem knowledge.

Regarding service requirements, Immonen et al. (2016), describe that a digital services ecosystem is a new type of self-organized environment that addresses openness and dynamism, enabling collaborative innovation and co-creation among ecosystem members. And, in view of this scenario of fully automated and customer-controlled deliveries, the development of service requirements engineering (RE) in order to propagate the value, contextualization, mapping of subsystems and communication of stakeholders in this dynamic network of value. Thus, in order to explain this development, Immonen et al. (2016) explain that there are three different types of ecosystem definitions that are related to each other, according to Figure 2.

In the Business Ecosystem there is a dynamic structure of organizations that work together in a specific core business creating value in a network of actors and can spontaneously emerge from common interest or demand, or as a result of strategic planning.

The Business Services Ecosystem is a part of a service ecosystem, but it covers only the digital part and can be characterized as: open, loosely coupled, domain-driven, demand-driven, self-organized to the agent environment, where each (human, species and digital species, ie, computer, software and application) is proactive and responsive to its own benefit or profit.

Regarding the Software ecosystem, there is technology that supports the ecosystem while in a Digital Services Ecosystem members are not tied to a shared development platform or technology, so a Software Ecosystem can be part of a service ecosystem but software should be provided as a service to the ecosystem.

Finally, Peltoniemi and Vuori (2004) describe the importance of Business Ecosystems, which, according to the authors, are characterized by self-organization, co-evolution, emergence and adaptation. According to Moore (1996), the text deals with the different types of ecosystems (biological, industrial, economic, digital and social) to explain, according to Moore (1996), that ecosystems are supported by a foundation of interested organizations and individuals mutual

In addition, Peltoniemi and Vuori (2004) highlight the following characteristics of Business Ecosystems: complexity (systems with many different and self-organized parts), self-organization (capacity of complex systems to create new order and coherence), emergence creates a new order along with self-organization), co-evolution (process in which interdependent species evolve in an infinite reciprocal cycle), and adaptation (the process by which an organism fits into its environment).

So, Peltoniemi and Vuori (2004) point out that the Business Ecosystem has a dynamic structure consisting of an interconnected population of self-sustaining organizations that develop through self-organization, emergence, and coevolution in order to acquire adaptability.

4. Final Considerations

After a general overview of the evolution of the studies on Digital Ecosystems, the relationship of the object of analysis of this review to the business was verified. The first conclusion, in this sense, is that from the present database, there are several studies that associate the phenomenon of the Digital Ecosystem with the businesses developed by a set of organizations (small companies and / or large organizations) self-sustaining.
Finally, it is hoped that the present article will contribute to the advancement in the understanding of the topic Digital Ecosystems and that new studies be fomented to the consolidation of the theme in its diverse facets, contemplating the computation, the human and computational sciences, the business, the management and strategy.

As future work we suggest the complete description of a case of application of the Digital Ecosystem in a Brazilian organization and its contribution in the results of a company in relation to its competitors.

We thank the FOUNDATION OF AMPARO FOR THE RESEARCH OF THE STATE OF SÃO PAULO (FAPESP) for the support of the research project "New technological ecosystems in productive systems: A Review and Research agenda for digital business platforms"

5. References