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Identifying elements of the digital economy ecosystem

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ABSTRACT

Purpose. The aim of this article is to identify the key elements of the e-commerce and digital economy ecosystem using scientific literature. The article addresses the factors that are the driving force behind a digital company's success in the digital economy and contributes to the basic knowledge of the digital economy concept.
Design/methodology/approach. For the scientific literature review, the method used was qualitative content analysis aimed at identification of the key components that are involved in the formation of the ecosystem of the economy.
Findings. The research results include the components identified that subsequently form the elements of the digital economy ecosystem. This allows for an assessment of what is already known about the practical aspects of the problem, using systematic literature review methods. Therefore, it becomes possible to analyze the concept of the digital economy and its transformation by considering its current elements – which are characterized as elements of previous trends – and make an attempt to determine their effect on various aspects of e-commerce.
Research limitations/implications. The new developments in the economy are based on the evolution of digital technologies. The research considers the concept of the digital economy. Globalization processes increase the speed of information exchange and emerging new commercial activities in digital technologies. To comprehend the significance of each component identified, the authors apply the results of previous research to combine the categories of digital economy ecosystem elements and definitions.
Originality/value. The article includes extensive analysis of the factors, suggesting that it can be regarded as novel in identifying the ecosystem elements for e-business in the digital economy. The concept of ecosystem implies certain functional characteristics that specifically regulate change or maintain the stability of a desired balancing state.
Keywords: digital economy, ecosystem, e-business, e-commerce, knowledge, resource, technologies
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INTRODUCTION

The capability of companies working in e-business is distinguished by a high rate of technological change. They encounter the need to follow market requirements in determining their business direction. These enterprises set a high level of competitiveness among participants of the e-business sector. As a result, the transformation of the production process has contributed to changes in the planned development of e-companies. They have become agile and are characterised by their ability to adapt to shifts, achieve closer integration between processes and technology updates, and be resistant to economic and social changes. According to the McKinsey Global Institute, up to fifty percent of business operations in the world could be automated in the next 20 years.

Chakravorti, Tunnard, and Chaturvedi (2016) believe that we are on the way to becoming a digital planet, but every country is at a different stage in its efforts to create a digital economy. Digital commerce had a shaky start but has been rapidly embraced worldwide. The stages in the evolution of digital commerce are as follows:

- The Denial Phase. In 2000, Internet use in business was met with scepticism, but then suddenly it was everywhere.
- Global Adoption. In 2007, as the West grappled with an economic crisis, other countries were rapidly plugging into the global digital economy.
- Mobile Connectivity. In 2015 and beyond, the next billion people are going online worldwide thanks to mobile connectivity.

The percentage of retailing done online globally has grown steadily and that growth is expected to continue. According to Chakravorti et al. (2016), as experts look ahead to 2030, they wonder what the digital planet will look like.

Digital evolution is more than just e-commerce. Digital systems have facilitated societal changes, impacted elections, and increased awareness of key social issues (Chakravorti et al. 2016). Interpreted in this way, the “new” or “digital” economy is about dynamics, not static efficiency. It is more about new activities and products than about higher productivity. What is really new in the new digital economy is the growth of information and communication technology (ICT) to a new level and direction of connectivity among multiple heterogeneous ideas and participants, giving rise to a vast new range of combinations.

Consequently, the literature review is directed toward highlighting definitions of the digital economy concept for e-commerce enterprises, focusing on networking settings and ICT technologies that support knowledge development while creating the global information infrastructure. The study researches the basic elements: knowledge, innovation, and the ability to transform, i.e. agility. The interaction of these elements stipulates the concept of the ecosystem of the digital economy.

The object of the research is the digital economy and its elements.

The subject of the research is the interaction of digital economy ecosystem elements, such as knowledge management, rights management and communications technology or features, infrastructure and services within the digital field.

The methodology comprises a literature overview and interpretation, applying the scoping review method, which allows for an assessment of what is known about the practical issues. Systematic review methods are used to assess the existing research.

The new century aims to revise the traditional definition of economics. Such a direction creates a new perspective on economic and social relations, focusing on the study of opportunities and constraints. The main components of the digital economy and basic questions concern the formation of the ecosystem.

METHODOLOGICAL BACKGROUND OVERVIEW

In both older and more recent studies the general definition of "digital economy", "Internet economy", "new economy", or "web economy" is often taken from Don Tapscott (1997). Tapscott is the founder of the modern digital economy movement. In his book *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*, Tapscott (1995) introduced the concept of the "digital economy", offering a broader understanding of how the Internet is changing the traditional concept of "economy" in the context of the digital economy and specifying opportunities which arise when launching a business in a digital environment and the changes it is exposed to.

The widely accepted concept by Thomas Mesenbourg (2001) identifies three primary components of the digital economy: e-business infrastructure (hardware, software, telecoms, networks, human capital, etc.), e-business (how business is conducted, any process that an organization conducts over computer-mediated networks), and e-commerce (transfer of goods, for example, when a book is sold online). In addition, it is important to note that a common feature of both e-business processes and

e-commerce transactions is reliance on the use of computer-mediated networks (Mesenbourg, 2001). Mesenbourg (2001) noted e-commerce as an initial measurement priority. Then he identified e-understanding and measuring business processes as a second measurement priority. He focused on providing an annual e-commerce measure for 1999, a time when e-commerce was starting to become economically significant. He adopted estimated quarterly retail sales to measure e-commerce as a percent of total sales (Gumaha & Jamaluddinb, 2016).

Historically, the digital economy was based on industries and forms of IT-enabled business activities that were likely to be significant sources of economic growth in the next decade. These included the IT industry itself, e-commerce among businesses, the digital delivery of goods and services, and the IT-supported retail sale of tangible goods. Researchers suggest these developments were initiated (in the U.S.) in the 1950s long before the Internet was conceived as a commercial service, and widely expanded during the 1960s, 1970s, and 1980s (Kling & Lamp, 1999; Gumaha & Jamaluddinb, 2016).

Research work on e-business management is actively engaged with the scientific and industry communities on such topics as the management of the internet-based enterprise, new product development in complex production

domains, and innovative technological architecture. The resulting discussion raises the question of the "digital e-commerce ecosystem" concept.

In the context of the e-business ecosystem a modern organisation can be described as massively interconnected networks of groups, departments, alliances, peripheral organizations, suppliers or ventures. In this context organizational life is the property of both the single organization and the ecosystem. This loose web constitutes a business ecosystem, that is, an interconnected "network of networks" of co-evolving organizations, with a specific connection to a dominant organization.

In terms of organizational models, organizations are increasingly being structured as portfolios of projects in which modules and competencies can be reconfigured around emerging needs. As a biological system, a business ecosystem is a non-homogeneous community of entities made up of a large number of interconnected participants with different interests; they depend on each other for their mutual effectiveness and survival, and so are bound together in a collective whole, according to research by Corallo, Passiant and Prencipe (2007). Regarding diversity and the e-business ecosystem, globalization of markets and industries generates powerful forces towards increasing homogeneity on the one hand and, by opening new markets and cultures, increasing heterogeneity on the other hand. These trends cross the e-business ecosystem as meta-organizational structures that manage the tension between, on the one hand, heterogeneity of resources leading to innovation and potentially to chaos and, on other hand, homogeneity of actors and behaviours leading to greater coherence and focus (Corallo et al., 2007).

The authors aim to reveal the principles of an ecosystem approach for e-commerce development in order to create an objective coherence of digital economy elements. In addition to the literature overview, the authors have employed a graphic representation of the results. Because the global economy is increasingly driven by digital businesses, there is a need for theoretical knowledge that elucidates what the actual value-creating elements are.

RESULTS AND DISCUSSION

This section continues the literature overview using qualitative content analysis and considering the key components that are involved in the digital economy ecosystem.

The result is a table with codes which include the components that subsequently form the elements of the digital economy environment. The main idea here is to provide explicit definitions, examples and coding rules for each category, determining exactly under what circumstances a text passage can be coded within a certain category. The category definitions are closely related to the coding agenda.

The literature review includes previously published articles and papers in order to follow the dynamics and reveal the trend of changes and approaches to the digital economy as an ecosystem during the last decade. This is an important aspect, since an ecosystem is like a living biological organism, and factors influencing its development need to be studied in the same way as biological factors influencing the creation of an ecosystem in its classical form. Technology and paradigm shifts are

grouped around cyber-physical systems that have started to evolve into an ecosystem of standards for new industries and for other applications of the digital economy. The digital economy opens the way for the previously unthinkable integration of industrial systems, transport, cities, energy and many other ecosystems into a single standard. In this article, we discuss this project from an industrial point of view (Jackson, 2011).

Table 1

Digital Economy Ecosystem Components

No	Category	Author / publication title	Code
1.	DE Advantages	Bosch J. (2016), Lang J. (2002)	Digital e-business competitive advantage; DE innovation technology / DE advantages
2.	DE Characteristic	Jackson D. J. (2011)	Ecosystem concept / DE characteristics
3.	DE Concept	Turban E., Outland J., King D., Lee J. K., Liang T-P., Turban D. C. (2017)	DE concept
4.	DE Definition	Brynjolfsson E., Kahin B. (2002)	DE definition
5.	DE Ecosystem Characteristics	Yamakami T. (2010)	DE ecosystem characteristics
6.	DE Ecosystem Concept	Kuprijanovskij V. P., Namiot D. E., Sinjagov S. A. (2017), Oh D. S., Phillips F., Park S., Lee E. (2016)	DE ecosystem concept / new technology advantages
7.	DE Ecosystem Elements	Briscoe G. (2010)	DE ecosystem elements
8.	DE Ecosystem Functioning	Tsatsou P., Elaluf-Calderwood S., Liebenau J. (2010)	DE functioning / DE characteristics
9.	DE Ecosystem Interaction	Weill P., Woerner S. L. (2015), Elder-Vass D. (2016)	DE ecosystem interaction
10.	DE Elements	Peitz M., Waldfogel J. (2012), Gumaha M. E., Jamaluddinb Z. (2016), Mesenbourg T. L. (2001)	DE segment / DE concept / DE elements

11.	DE Gap	Sawy O. A., Pereira F. (2013), Rantala T., Ukko J., Saunila M., Puolakoski H., Rantanen H. (2016), Ohman J. (2010), Wirtz B. W., Daiser P., Binkowska B. (2018), Teplykh G.V. (2018)	DE the paradigm does not exist to redesign the business model / DE gap in research / DE values / DE gap DE values / DE innovation gap DE knowledge gap / DE interdisciplinary connection DE knowledge gap
12.	DE Innovation Development	Barrell A., Rigby M. (2015), Lang J. (2010)	DE innovation / DE advantages
13.	DE Interaction Methodology	Corallo A., Passiante G., Prencipe F. (2007)	DE interaction methodology / digital business ecosystem concept
14.	Rights Management	Sundararajan A. (2016)	DE value creation by intellectual capital / rights management
15.	DE Social Security	Konkolewsky Hans-Horst (2017)	DE social security
16.	DE Integration Dynamics-Pace	Chakravorti B., Tunnard C., Chaturvedi R. S. (2016)	DE integration dynamics-pace digital evolution index
17.	DE Interdisciplinary Connection	Briscoe G. (2013), Green A. (2013)	DE interdisciplinary connection / DE advantages
18.	DE Innovation Driver	Hafkesbrink J., Hoppe H. U., Schlichter (2010), Weill P., Woerner S. (2013)	DE concept / DE value creation / DE innovation driver DE value creation DE advantages / DE innovation driver DE advantages
19.	DE Factors	Dini P. (2012), Warren L., Fuller T. (2010), Bauer J. (2018), Tapscott D. (1997, 1999, 2000)	DE value / dynamical price creation / DE threats / DE factors DE factors for e-commerce
20.	DE Technology Innovation	Tapscott D. (2000), Leong C. M., Pan S. L., Newell S., Cui L. (2016), Daidj N. (2015), Pastuszak Z. (2010)	economy growth / DE value creation / DE innovation for communication / consumer-supplier connection in ecosystem DE advantages / technology development and innovation

Source: created by the authors

Despite the increasing amount of literature on value creation in the digitalized world, theory still does not fully reflect the complexity and dynamism of the delivery of value digitally. This study contributes to this research gap by presenting the characteristics of value factors and elements in digital business that contributes to value creation as per Rantala et al. (2016).

The frequency of these categories can be demonstrated by a graphical interpretation.

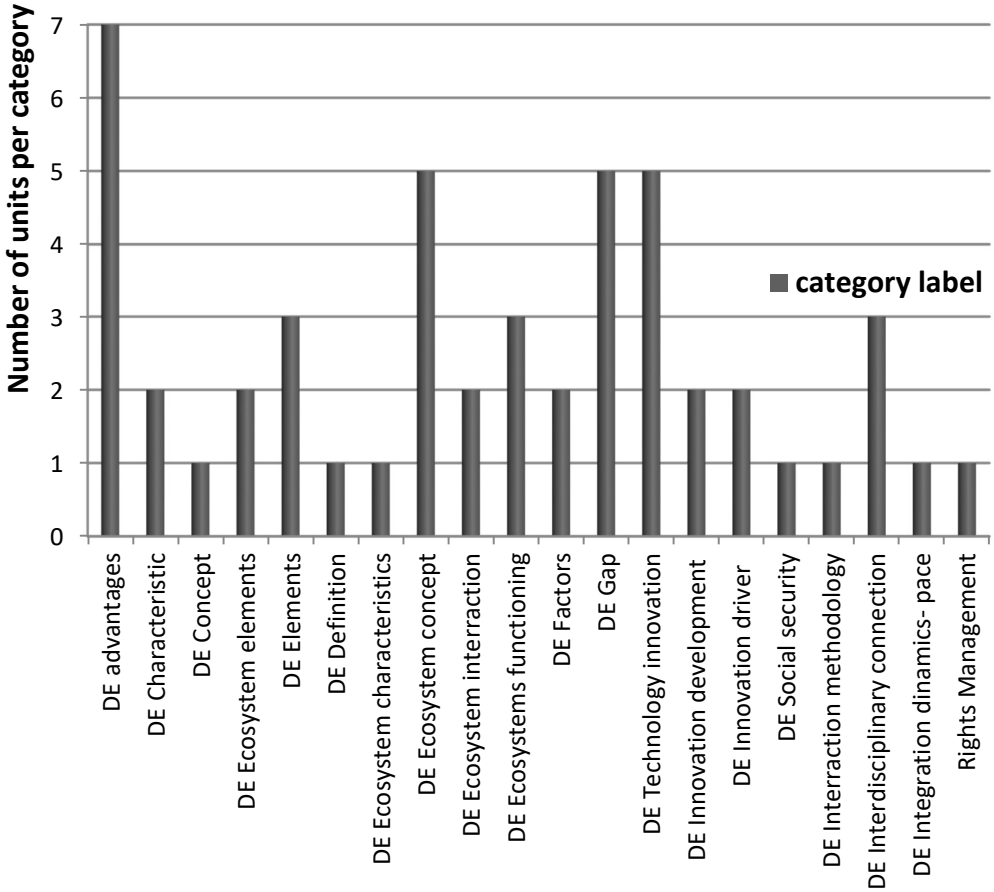

Figure 1. A graphical interpretation: categories and frequency
Source: created by the authors

Category definitions, prototypical text passages and rules for distinguishing different categories were formulated according to the theory and material, then gradually completed and revised in the process of analysis.

The main components of the digital economy identified in the analysis are its advantages, current gaps, technology innovation and interdisciplinary connection. The literature review showed only the presence of components of the digital economy which could be characterized as elements of previous trends. Therefore, the authors' aim was to determine their effect on the respective aspects of e-commerce. Further research would be necessary to apply these results in order to combine the categories of ecosystem elements and provide a

comprehensive definition for each of them.

CONCLUSIONS

The authors came to the conclusion that the codes ascertained reflect the impact of the structure of the ecosystem on e-commerce.

1. The study obtained twenty elements that are the driving force of digital company success in the digital economy.
2. Gaps have been identified that need further research, taking into account that the concept of the digital economy and its functioning is an emerging trend in the economies of industrial and developing countries.
3. According to the results of the study, the authors have identified the impact of such factors as social security, ITC development, copyright management, and interdisciplinary interaction of the ecosystem on e-commerce. In addition, the research results indicate that an extensive analysis of the factors is required in order to determine the characteristics of the digital economy field for e-business.
4. Further studies should focus on a deeper analysis of the gaps and the methodology involving interactions of ecosystem elements for e-commerce.

Our recommendation for additional research is to prioritize the study of the drivers of the increase in economic growth. Equal attention should be paid to the research of digital economy technology innovation and innovation development as factors which drive the economy.

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