

Article

Value Migration to the Sustainable Business Models of Digital Economy Companies on the Capital Market

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Abstract: The topic of a sustainable business model is currently the subject of much scientific research that covers a wide range of topics, from terminological aspects to aspects related to the impact of sustainability factors on company development. So far, however, the topic of sustainability in business models operating in electronic markets has only been studied to some extent. This article covers broad research into the value migration to sustainable business models of companies operating in the digital economy on the capital market. The aim of the article is to present key results of research into value migration to sustainable business models of companies operating in the digital economy on the capital market. The relevant literature on the trends in the application of the sustainability concept in the digital economy, the attributes of business models, and the interpretation of value within the concept of business models is also reviewed. The results obtained are ambiguous.

Keywords: value migration; value capture; sustainable business model; digital economy

1. Introduction

The digital economy is shaping many new business models. The development of business models based on the Internet initiates many solutions [1]. The Internet is constantly opening new spaces for creating added value [2]. The dynamic development of networking is driving by the fast-paced evolution of digital technologies that foster the shaping of innovative business models. A key topic for modern approaches to business model design is achieving sustainability.

Digital economy business models based on the assumptions of contemporary trends, such as the sharing economy, the network economy, the Big Data and the circular economy, in addition to being based on IT applications in many cases, are also based on rules that are different from the traditional approaches to the neoclassical economy. The applicability of these solutions means that they are increasingly adopted by business practice, which results in undermining existing business models. Sometimes doubts arise about the integrity and even in some cases, the legality, of the proposed solutions. Their important attribute is that they are based on community development. It ensures better availability of goods, rationality of their use and improvement of people's quality of life. Trends in the digital economy influence changes in the perception and understanding of the essence of the modern world and the approach to social, ecological and economic aspects.

The concept of sustainability, widely explored in science in recent years, can play an important role in shaping and adjusting these innovative business models. As regards the concept of sustainability, the key role is played by a longer perspective of studying business, which, in the context of the dynamic development of new technologies creates new challenges, such as positive or negative perceptions of digital platforms by society.

Generally, Sustainable Development ensures the preservation of natural resources, which ensures the natural function of local ecosystems and of nature in general. Sustainable Development influence on solidarization and cooperation with other communities. Economic Sustainable Development

ensures quality of life through economic self-determination and self-development of both individuals and societies [3]. Based on the assumptions of this concept, which ideologically refers to the macroeconomic approach, its narrower trend focused on building the theory and application solutions called sustainability has emerged. It is a model to keep managers predisposing their specific attitude to business management.

Generally, in theory and practice, several approaches to sustainability can be distinguished:

The classic approach broadly described in the literature and well-recognized as the Triple Bottom Line [4]. This approach is often used by mature companies which create the strategy based on stakeholder analysis and corporate social responsibility [5]. Their business model incorporates a balance of ecological, social and economic factors. In their strategy of competitive advantage these companies apply the triple bottom line rules for example by including ecologically friendly products into their offer, undertaking activities for positive impact on environmental protection, and striking a balance between all stakeholders interests. There are different aspects, which are described in the range of classical approaches to sustainability, for example: typology [6], aspect of life cycle of enterprises [7], rules for corporate social responsibility [8], and green supply chain [9].

The second approach is based on assumptions, for example of S. Schaltegger et al., who say that: ‘The value proposition must provide both ecological or social and economic value through offering products and services—business models for sustainability describe, analyze, manage, and communicate (i) a company’s sustainable value proposition to its customers, and all other stakeholders; (ii) how it creates and delivers this value; (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries [10]. In this holistic approach ‘no sustainable value can be created for customers without creating value to a broader range of stakeholders’. This also includes a management approach which aims at achieving success in a fair manner for employees. This topic is widely developed in the literature [11–13]. Schaltegger approach to sustainability is focused on the assumption that the condition for companies’ success is to design business models for sustainability, not as in the approach of Triple Bottom Line to meet conditions adequate to social, economic and ecological behavior. The essence of the newly designed business model is the use of sustainability attributes to build a competitive advantage.

The third approach addresses the specific aspect of economic sustainability in combination with the emerging shared economy business models that are enabled by the networked economy. It is very important for the sustained continuity of these business models to consider topics such as social, ecological and labor rules, which may be captured in legal requirements but also in social norms and values. The concept of the sharing economy is now widely discussed in literature [14–17]. This approach differs significantly from the previous ones because it focuses on the ethics of business behavior in the context of legal conditions. Especially, that new solutions undermine existing business models which raises a lot of controversy. In addition, new concepts using social communication platforms provide opportunities for better access to goods for those social groups that could not afford it. In this way, a new social order is shaped, which requires extensive theoretical research and verification of application solutions.

The fourth approach to the understanding of the concept of sustainability is sustainability’s role in creating the New Theory of Property Rights, which will be important in the context of designing business models [18]. Property rights emphasize the importance of individual and transferable property rights for an effective allocation of resources in the economy. The theory of property rights assumes that property rights allow for limiting the scope of non-changeable relations in the economy [19].

This concept refers to the difficult relationship and even contradictions between ownership and the fulfillment of sustainability requirements. These dilemmas are crucial for the success of the implementation of balanced solutions in the social, economic and environmental spheres. To some, sustainability primarily refers to energy efficiency or to the slightly broader principles of efficient resource conservation. To others, sustainability requires radical changes in our social and political

institutions. Indeed, some proponents of sustainable development argue for “socially just development world-wide” that “should attempt to address important social and political issues related to the inequitable allocation of the world’s resources.” Still others envision sustainability as a fundamental human right [18]. In this context the right to property and the freedom to dispose of it can be limited by the demands placed on enterprises in the aspect of social pressure of various groups of stakeholders sensitive to the balance in many aspects of life.

The fifth approach to the sustainability concept that can be distinguished is the approach related to the concept of Corporate Social Responsibility. The assumptions of this concept are presented in the Carrol Pyramid. The key issue is the approach to corporate responsibility towards business. There is a philanthropic, economic, legal and ethical responsibility in this context [20]. The context of creating values through applying the Corporate Social Responsibility (CSR) assumptions is also important [21].

CSR assumptions support the conceptualization and operationalization of sustainability assumptions and may include many approaches depending on many factors. The most important thing, however, is that, instead of emphasizing profits, the most important concern for a company should be value [6].

An important approach to the development of the sustainability concept are the assumptions of the stakeholder theory. Honest relations with stakeholders create a business ecosystem based on respect [22,23].

Modern sustainability approaches are complex and based on a holistic approach [24].

The third approach to the understanding of the sustainability concept can be directly applied to a research problem defined. The social aspect of designing digital business models that provides opportunities for building a community and the creation of environmentally friendly technologies may influence value migration to attractive business models.

Sustainability should thus be seen in the context of building competitive advantage with an ethical approach to market play, supporting innovative solutions that have a positive impact on society, creating social value and social profit. The standard approach based on classic economy is designing innovative business models in the Internet environment that will provide the company a monopoly or dominance position. Often the related business models are based on a comprehensive data platform. Such central position allows these companies to reap the benefits of high margins. Recently this approach is strongly criticized.

In modern business models, classic economics provides only a partial answer as argued above and is furthermore challenged by the emergence of the sharing economy. The latter case requires to investigate sustainability in business models again. A firm’s business model is relevant to its ability to capture value because it is through its business model that the firm exercises its bargaining ability [25].

Several key challenges that are developed in the context of creating sustainable business models can be distinguished:

1. Triple bottom line—The co-creation of profits, social and environmental benefits and the balance among them are challenging for moving towards Sustainable Business Models.
2. Mind-set—The business rules, guidelines, behavioral norms and performance metrics prevail in the mind-set of firms and inhibit the introduction of new business models.
3. Resources—Reluctance to allocate resources to business model innovation and reconfigure resources and processes for new business models.
4. Technology innovation—Integrating technology innovation, e.g., clean technology, with business model innovation is multidimensional and complex.
5. External relationships—Engaging in extensive interaction with external stakeholders and business environment requires extra efforts.
6. Business modelling methods and tools—Existing business modelling methods and tools [26].

Companies operating in modern conceptual trends that use the potential of the digital economy are often not focused on maximizing shareholder value, but rather, on creating social value. Although the

original intentions may not be of an economic nature, the economic aspect is, however, a priority in the long-run. The technologies underpinning the new digital economy, most importantly and in rough order of maturity, include: (1) advanced robotics and factory automation (sometimes referred to as advanced manufacturing); (2) new sources of data from mobile and ubiquitous Internet connectivity (sometimes referred to as the Internet of things); (3) cloud computing; (4) big data analytics and (5) artificial intelligence (AI). The transformative potential of the New Digital Economy can only be realized if and when these elements mature, become better integrated, more interoperable, and broadly used. This is unlikely to be a simple, even, uncontested, or rapid process. Social and technical factors, such as data security risks or a backlash across various digital divides, could slow or even derail the development of the New Digital Economy [27].

Thus, the concept of strategic value plays a crucial role. Strategic value examined in this way and combining economic and social values determines the design of contemporary sustainable business models in the digital economy.

Digital platforms that ensure the creation of social relationships in the global world influence the emergence of sustainable business models that emerge directly from the assumptions of individual concepts and trends in the digital economy. They include the Circular Economy, Big Data, and the sharing economy. The traditional approach to designing business models following Circular Economy assumptions is based on the stages of the value chain delivery process, such as design, production, remanufacturing, distribution, consumption, use, reuse, repair, collection, recycling and recovery. The use of virgin materials and the development of solutions from the sphere of obtaining residual waste should close the circular economy circulation process. Many different approaches have been proposed for designing either circular or sustainable business models, however there is no consensus of an integrated vision of both concepts [28]. The assumptions of the Circular Economy are based on the application of the following principles, which in whole or in part constitute a configuration of business models focused on their implementation. ReSOLVE is a checklist of Circular Economy (CE) requirements proposed by the Ellen MacArthur Foundation that consists of six actions: regenerate, share, optimize, loop, virtualize, and exchange, each presenting an opportunity for CE implementation [29]. The scope and interpretation of these six activities covers the following areas:

1. Regenerate—shift to renewable energy and materials, reclaim, retain and regenerate health of ecosystems, return recovered biological resources to the biosphere.
2. Share—keep product loop speed low, maximize utilization of products by sharing them among users, reuse products throughout their technical lifetime, prolong life through maintenance, repair and design for durability.
3. Optimize—increase performance/efficiency of a product, remove waste in production and the supply chain, leverage big data, automation, remote sensing and steering.
4. Loop—keep components and materials in closed, loops and prioritize inner loops.
5. Virtualize—deliver utility virtually.
6. Exchange—replace old materials with advanced non-renewable materials, apply new technologies [30].

The literature recognizes digital business models and digital technologies as factors that facilitate the transition to the Circular Economy. They can be used to overcome the challenges of the Circular Economy [31].

Companies' fundamental challenge in implementing circular economy principles is to rethink their supply chains, and as a consequence the way they create and deliver value through their business models [32]. Circular economy business models have powerful innovation potential, which must be released by the creators of modern business.

The assumptions of the Triple Bottom Line concept, in turn, shape the understanding of a pro-ecological, ethical and economic approach to managing limited resources in a traditional way.

Big Data and the sharing economy focus on a completely different approach to the aspects of sustainable business. Their approach creates conditions for the creation of value from fast data processing and using the effect of community activity. While there is no universal definition of big data, there appears to be an emerging consensus about its uniqueness that distinguishes big data from what we recognize a large database to be like in a traditional sense. Three Vs of big data, namely volume, variety and velocity, have been introduced at an early stage of the development of this notion which reflect the continuous expansion of data in terms of multiplicity [33–37]. The use of large data sets for a broad approach to sustainability is developmental and, together with other concepts, is revolutionizing the world's economy. The sharing economy holds the promise for a more sustainable world by giving access to underutilized resources, at a fraction of the cost, to some who cannot or do not want to buy new products, and the chance of making an extra income for those who already own such underutilized resources. The sharing economy is seen as instrumental in facing wicked problems such as overconsumption and income inequality [38]. The sharing economy as: a socioeconomic system enabling an intermediated set of exchanges of goods and services between individuals and organizations which aim to increase efficiency and optimization of under-utilized resources in society [39]. From this perspective, the original assumptions of the sharing economy concept are part of the general assumptions of sustainable management, creating opportunities to implement sustainability assumptions by using innovative technological solutions on a previously impossible scale.

An important and noteworthy problem is value migration from less to more attractive business models. Adrian Slywotzky defines value migration as a flow of economic and shareholder value away from obsolete business models to new, more effective designs that are better able to satisfy customers' most important priorities. It reflects changing customer needs that will be satisfied by new competitive offerings. Value migration occurs when there is a disconnect between customer priorities and existing business designs [40]. The reason why value flows from business models may be the lack of mechanisms built into the way companies operate that ensure meeting environmental protection requirements and social and legal standards, which may generate a risk of lowering the market value of companies. This is especially important for companies at the early stage of development and listed on the stock exchange, including start-up companies, where investors assess potential chances and threats to an increase or decrease in company's market value very carefully. Because this type of market concerns a large number of companies that operate in the digital economy, the problem of value migration is also worth considering in terms of meeting sustainability requirements. Sustainability can generate a positive impact on value migration when sustainability features are a distinctive component of the business model. Then the value may flow from companies that do not apply sustainability assumptions to companies that use business models based on these assumptions. Sustainability can be an attribute that determines value migration. Therefore, a decision was made to conduct scientific research into the migration of the value of the business model of digital economy companies.

The theoretical framework presented was used to identify the theoretical and practical gaps in terms of the impact of sustainability factors built into the business models of digital economy companies on achieving their success. Undoubtedly, sustainability factors in the DNA of business models should have an impact on value migration on capital markets.

The aim of the article is, therefore, to present the key results of research into value migration to sustainable business models of companies operating in the digital economy on the capital market.

2. Trends in the Use of the Concept of Sustainability in the Digital Economy

The development of electronic markets is dominated by modern business. The number of areas implemented through digital technologies increases each year. This evolution has lasted for many years. R. Alt and H.-D. Zimmermann distinguish six stages in the development of the subject of electronic markets Table 1:

Table 1. Development of Digital Economy.

Period	Description
Proprietary era (1970–1990)	<ul style="list-style-type: none"> • Communication of documents (EDI) via proprietary communication networks (videotex, X.25-based value added networks), • Definition of electronic standards for transactions (e.g., American National Standards Institute (ANSI), Electronic Data Interchange for Administration (EDIFACT), Tradacoms) and directories (e.g., X.500), • Focused electronic markets and interorganizational information systems (e.g., airline reservation systems, financial exchanges, electronic shopping).
Early E-Commerce (1990–1995)	<ul style="list-style-type: none"> • Basic Internet technologies (e.g., TCP/IP, HTML, XML) are used for static HTML pages and web-based EDI, • Emerging standard application for interorganizational processes (ERP) and business process orientation, • Internet-based electronic malls pave the way for multi-vendor platforms which offer joint functionalities (e.g., directories, payment).
Early E-Business (1995–2000)	<ul style="list-style-type: none"> • Complex dynamic database-based web presences with more integration with business processes and application systems for online sales etc., • Evolution of XML-based standards for electronic business (e.g., cXML and eClass for electronic catalogs), • Evolution of standard application systems for E-Business (e.g., electronic catalogs, supply chain and customer relationship management).
Early digital value chains (2000–2005)	<ul style="list-style-type: none"> • Emphasis of E-Commerce shifted from B2C to B2B as well as to B2E (Business-to-Employee), • Integration of electronic business technologies with enterprise applications and emergence of integration solutions (e.g., portals, EAI), • Mobile channel becoming available based on GSM and RFID technologies.
Early digital ecosystems (2005–2010)	<ul style="list-style-type: none"> • Ecosystems with multi-channel clients linked with centralized electronic (market) platforms (e.g., App stores, open source communities), • Social media as enhancement and/or platforms for E-Business (e.g., Social CRM, Social Shopping), • On-premise solutions are becoming available as shared SaaS and cloud-based solutions.
Early convergence (2010–)	<ul style="list-style-type: none"> • Omni-channel environments where information is shared among all user locations (e.g., mobile, web, office/shop, car, public transport), • Consumerization shifts control to end user and user-centered life solutions (e.g., for health, mobility, finance) are becoming available, • Leverage technologies for storing and analyzing large volumes of data (big data) for business scenarios.

Source: [41].

The digital economy has provided much stronger change than changes in the previous decades, due to the following unique features (Watanabe et al., 2018b):

- Expanding Information and Communication Technology (ICT) and the digital economy at a tremendous pace;

- Value can be provided free of charge;
- ICT prices decrease and productivity declines;
- Digital goods are mobile and intangible, thus leading to substantially different business models;
- The boundary between consumer and producer is thinning, and consumers are becoming “prosumers;”
- Barriers of entry are low, making companies to innovate seamlessly;
- Companies can enjoy fully network externalities and the subsequent self-propagation phenomenon embedded in ICT products and services⁶;
- Companies are polarized between those enjoying network externality and those not;
- Digital companies have a tendency toward a gigantic monopoly;
- Contrary to a traditional monopoly, this new monopoly can enhance convenience [42].

It can be expected that in the near future, all the areas of human activity will be implemented with the participation of electronic media. They also contribute to changes in the behavior of consumers, which is important for the development of the sustainability concept [43].

The areas of human activity create new solutions by means of social media and it is important to define how they are used, whether this way is honest and does not harm other people, and whether it is in accordance with generally accepted social norms. This subject certainly requires a lot of research and analysis.

The traditional definitions of business models are based on an economic approach. According to D. Teece, a business model describes the design or architecture of the value creation, delivery, and capture mechanisms [a firm] employs. The essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit [44].

Extensive literature research into the issue of business model sustainability conducted by R. Biloslavo, C. Bagnola and D. Edgar indicates that the traditional approach refers to the pro-environmental, ethical and effective conduct of business regardless of whether it is run in the standard or digital form [45].

The sustainability is part of the trend of the verification of the social acceptance and legal and moral compliance of electronic media use. Sustainability is addressed in many areas related to electronic media [46]. As F. Lüdeke-Freund and K. Dembek indicate, foundational beliefs and concepts, a base of practical tools and resources, authorities and a community of actors emerge around the research and practice of sustainable business models that operate in both digital and physical spaces [47].

This approach is part of the European approach to the sustainable business model [48]. Digitalization opens new pathways for sustainability that will also affect the characteristics of sustainable entrepreneurial ecosystems [49,50]. The first attempts at identifying the concept of sustainability have already been made. F. Welle Donker and B. van Loenen referred the concept of sustainability to the concept of Big Data. In resolving the tension between the problem of lost revenue due to open data and the need to maintain adequate data service quality, a solution could be to develop a sustainable business model for open government data providers that ensures the availability of quality open data in the long-run. They focused on the service component as it forms the starting point of any business model, and on the financial component as this component determines the sustainability of all other components, i.e., the finances determine the level of service, the technical and organizational aspects. Their approach provides several hands-on proposals for self-funding agencies having to implement an open data policy whilst ensuring their long-term sustainability [51].

The concept of sustainability is examined in the context of the sharing economy, which is characterized by many features that are part of sustainable business model philosophy. Business models based on the sharing economy share resources, making natural resources less exploited (fuel consumption when sharing space in the car, energy consumption to heat the house in the case of sharing a flat or other resources). In addition, sharing creates a positive attitude and

reduces the level of consumption, which, in global terms, affects the social and environmental factors of the quality of life. This approach creates sustainable consumption and makes the users of goods and services seek to use limited resources intelligently. In this case, ownership is not a priority but sharing is preferred, which from an economic point of view, generates less consumption and optimal use of limited resources [38].

The perspectives of the sustainable development of the sharing economy suggest the use of perspectives to measure the performance of sharing economy business models in economic, environmental, social and technological areas.

- The economic area is defined as an organizational domain that emphasizes practices, discourses, and material expressions associated with the production, use, and management of resources.
- The ecological area is defined as an organizational domain that emphasizes the practices, discourses, and material expressions that occur across the intersection between the organizational and the natural realms.
- The social area is defined as an organizational domain that emphasizes the practices, discourses, and material expressions associated with the formal and informal processes; systems; structures; and relationships actively support the capacity of current and future generations to create healthy and liveable communities.
- The technological area is defined as an organizational domain that supports and enhances a “good life” for all of its employees, customers and society as well without compromising the Earth’s ecosystem or the prospects of later generations [52].

The discussion on the application of sustainable business model assumptions is also developing in reference to Peer-to-Peer (P2P) sharing platforms.

P2P sharing platforms such as Airbnb, Uber, TaskRabbit and Peerby are ‘multisided platforms’: intermediaries that bring together two (or more) distinct groups of users (e.g., hosts and guests, drivers and riders) and enable their direct interaction.

The triadic business model, involving a platform operator and two customer groups, the suppliers and consumers of the service of these two-sided markets has been variously referred to ‘sharing-based’, ‘accessibility based’ as guests, drivers, riders and enable their direct interaction. Arguably, the criteria to assess the success of sharing-based business models (especially if adopted by social enterprises) should go beyond traditional financial metrics (e.g., revenues) and take into account the platform’s market penetration, the level and type of user engagement, and the social and environmental impact [53]. In this aspect psychological drivers shapes customer’s willingness to participate in co-creation activities. Being a participant in a larger community conducting similar views builds social identity and sensitivity to social and ecological factors. Co-creation then has significance, not only in the context of business and consumption aspects, but also in the improvement of the world.

The concept of the circular economy, important for sustainability, deals with environmental aspects. The circular economy (CE) can be a driver of sustainability and it can be promoted and supported by the creation of new and innovative business models, which embed CE principles into their value propositions throughout the value chains [30]. The modern concepts of the digital economy require assessment in terms of sustainability, not only in the context of social, economic and environmental assumptions, but also in terms of the concept of value, which can be created. Using a sustainable business model, value can be captured from the market. Company market value and social profit can be created by means of a sustainable business model. Value migration plays a key role in this respect. While value migrates to business models of the digital economy, it disrupts other traditional industries that are becoming unstable and labile.

3. Value Migration to the Sustainable Business Models of Digital Economy Companies

The digital economy is now a turning point and the driving force of global business. This results in the emergence of new business models, whose existence depends on the development of this trend. A crop of concepts as well as related business formulas are emerging. The key trends that create opportunities for the emergence of new and innovative business models include concepts such as the sharing economy, the network economy, the circular economy and Big Data. These solutions are based on technological assumptions and a wide impact on social phenomena. The value captured from an enabling technology is thus likely to be highly limited relative to the social returns to the innovation. Because the private returns do not reflect their value to society, inventors will underinvest compared to the level that would be socially optimal [54].

In the context of these trends, the book value of the company is of less importance, whereas intangible assets play an increasing role. They determine the attractiveness of the business model resulting from its functionality. Data is increasingly the basic component of the assets of digital economy companies. It is evidenced by the dynamic development of the Big Data concept, which changes the approach to the valuation of companies. In many cases, having access to a large number of data sets determines the high market valuation of companies [55]. The trend focused on the creation of strategic value is the concept of the sharing economy. In the relevant literature, this approach has been dynamically developed in recent years. The sharing economy was first used by Prof. Lawrence Lessig from Harvard University, where he described it as consumption resulting from sharing, exchanging and hiring resources without the need for goods. This activity began to spread by sharing unused resources between people [14]. Authors such as R. Botsman and R. Rogers [56], A. Stephany [15], R. Belk [17] and others contributed to the recognition of this approach. In the relevant literature, the concept of sharing resources and relationships between cooperation actors may refer to at least several varieties. The collaborative economy, the peer to peer economy, the sharing economy, the collaborative consumption and the mesh economy can be defined. In practice, the concept of the sharing economy refers mainly to the forms of cooperation in terms of Business to Consumer (B2C) and Consumer to Consumer (C2C) transactions. This is of fundamental importance in the area of the construction of business models and the interfaces that take place between these entities, both in the sphere of relationships and the construction of business models that interact with companies. Contemporary business continuously being disrupted by startups and established firms utilizing sharing economy approaches [38]. The same applies to the concept of the circular economy. It also changes the approach to business, especially in the sphere of environmental protection. In the relevant literature, a significant and dynamic increase in the number of publications devoted to this subject can be observed [30]. The circular economy, indeed, is based on the establishment of closed production systems, where resources are reused and kept in a loop of production and usage, allowing for generating more value and for a longer period. Despite the interest in the circular economy by politicians and practitioners, scholars, particularly in the strategic management field, are still struggling with a lack of a framework explaining how companies willing to become circular adapt their existing business model or create a new one [57]. The development of the digital economy mainly involves the processing of large data sets (Big Data), which has become a leading scientific area with reference to the name of data science. An increased number of companies from the private sector as well as government agencies and public institutions benefit from the results obtained in the analysis of large data sets. This has a significant impact on the creation of innovative business models based on a large amount of data. In recent years, a very dynamic new trend initiating innovative business models has been developing, namely Open Data. Open Data portals collect various data that may be helpful in the design of new and innovative business models, which could not exist without the potential of these databases.

The aforementioned concepts function within the framework of the network paradigm, where a distinctive factor is cooperation and competition, disrupting existing business models, creating opportunities to develop new and innovative solutions in the field of business. The dynamics and the impact of new business models generate changes in individual industries and sectors of the economy. Business models may survive by striving to achieve sustainability, which can be considered a decisive feature that determines the investment attractiveness of business models. It can be assumed that a sustainability attribute is the key value of modern business models, which affects business and social ecosystems [30]. According to G. Mahajan, value is balance between the effort and the result, and if the value is positive (that is, the perceived effort is less than the perceived result), value is created. If the reverse happens, value is destroyed. Value is also the benefit one gets versus the cost, and is generally seen in competitive situations, since actors have alternatives. The difficulty with value is that it is intangible because value depends on the value ecosystem and their perception of value. Value is fundamental, it is what we are seeking (it exist whether we notice it and not see it); value is what is good (or meritorious), useful, important or worthwhile [58]. It is visible on the capital markets, which is manifested in value migration from less attractive to more attractive models. Value migration will depend on the qualitative attributes, which include the features of sustainability, which can be considered as a key platform for the business model formula, which may translate into value migration described by means of quantitative variables. The quantitative variables of value migration include:

- The relationship between market value and sales revenue [40],
- The growth rate of sales revenues,
- The growth rate of company market value,
- The growth rate of the Price-to-Equity (P/E) ratio,
- The growth rate of the Price-to-Book Value (P/BV) ratio,
- The scalability of the business model measured by the quantitative state, in which an increase does not force expenses out of proportion to the scale of growth. A perfectly scalable state is when companies, by gaining increased returns, create ever higher profitability.

Essentially, value migration has three stages which were presented in Figure 1: (A) Value inflow: In this phase, a company or an industry captures value from other industries or companies due to superior value proposition. The market share and profit margins of the company or industry expand. (B) Stability: In this phase, competitive equilibrium is established. Growth rates moderate. (C) Value outflow: Value starts to move away towards companies or industries meeting evolving customer needs. In this phase, market share declines, margins contract, and growth stops [59].

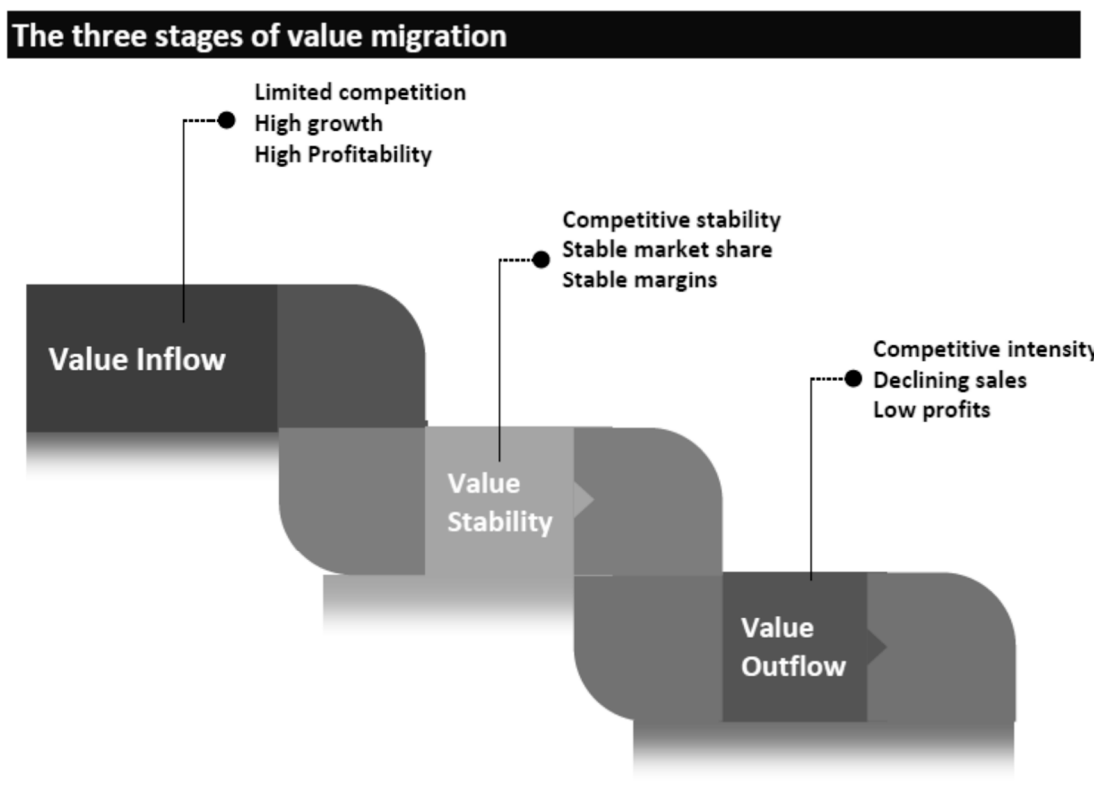


Figure 1. The three stages of value migration. Source: [59].

The causes of value migration are: Customer priorities, an essential catalyst for value migration, change due to a multitude of factors. Hence, there could be several drivers of value migration. Some time-tested drivers are (1) technology; (2) cost; (3) convenience; (4) lowering of entry barriers; (5) lower switching costs; (6) easier access to capital and (7) innovation [60].

Generally, in services, the value is considered from the point of view of two approaches. Value in use and Value in exchange. Value in use refers to the tangible features of a commodity (a tradeable object) which can satisfy some human requirement, want or need, or which serves a useful purpose. Value in exchange it is the ability to trade an asset, such as money, for goods and services. Money has no “value in use.” In itself, it does not satisfy wants or needs. To satisfy wants and needs, it must be traded. Although money has no value in use, it has value in exchange [60]. In this article value in exchange has leading character.

In addition to the financial approach to value, other categories of values should be defined, resulting directly from the nature and specificity of the ontological nature of the business model. An aspect leading to value migration is the innovation attribute of the business model. Figure 2 presents the selected types of innovative business models in the context of value migration [61]. Research conducted by F. Hacklin, J. Bjorkdahl and Martin W. Wallin indicates that when value rapidly migrates across industries and between firms, proactively substituting key elements of the primary business model provides a better fit with the new value landscape than launching secondary business models in parallel [61]. Therefore, it is advisable to quickly reconfigure business models in terms of their components to ensure their ability to capture value from the market with the help of the created value proposition for customers, which means that the company, by retaining value, contributes to the growth of value for shareholders/investors.

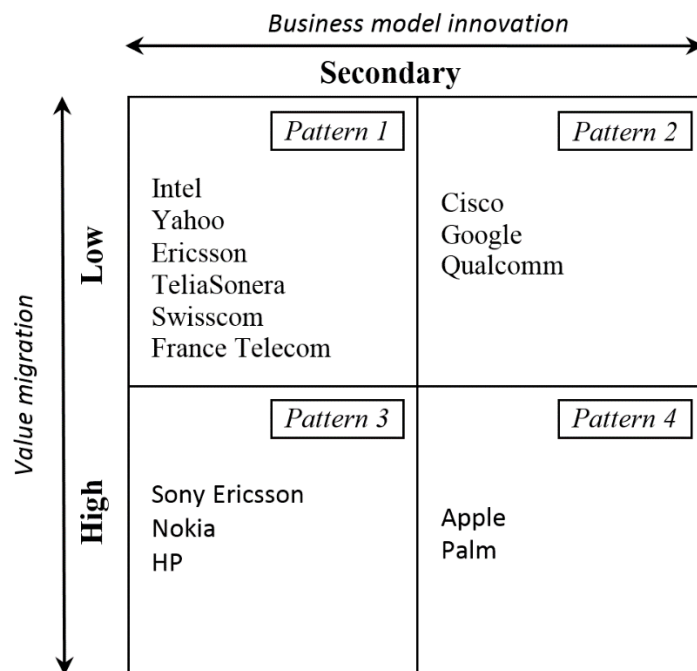


Figure 2. Case firms' selected type of business model innovation versus value migration. Source: [61].

Value migration in the examples of business models presented depends on the primary and secondary innovation of the business model. Primary innovations are based on the initial idea of the component structure of business models, while secondary innovations are created during the life cycle of a company, when the initial principles of the business model operation may change due to new market expectations.

Pattern 1. Secondary business model innovation under lower value migration. A variety of firms who found themselves in an environment of lower value migration—Yahoo, Intel, Ericsson, TeliaSonera, Swisscom and France Télécom—pursued. Pattern 2. Primary business model innovation under lower value migration.

At the same time, a second group of firms in equally stable environments adopted a different response resulting in both better and worse performance than the first group of firms. This group of firms—Cisco, Google, and Qualcomm—chose to probe, pivot and implement substantial changes to their primary business models. Pattern 3. Secondary business model innovation under higher value migration Nokia, Sony-Ericsson, and HP are cases in point. In the case of Hewlett-Packard Company (HP), value started to migrate from their traditional PC business towards online offers. HP complemented their primary business model of selling computing and printing hardware with an ecosystem for online digital photo printing, free online photo albums, and free photo-sharing services. Pattern 4. Primary business model innovation under higher value migration Apple, on the other hand, successfully adapted their primary business model to be at par with a rapidly changing business environment. Apple realized that as computing and mobile technologies converged, value would start to migrate toward smarter devices and services. As they were at that time strongly in a device business related to personal computers (the Mac and later the iMac), in response the company started to pivot their primary business model. Initiating a number of such pivots, Apple launched the iPod in an effort to bring music experience through a new form of MP3 players to a wider consumer market on the basis of a simpler and slicker user interface [61].

The model should therefore be subject to dynamic changes to ensure the ability to retain value and ensure the inflow of value due to the attributes of the business model. When an industry is characterized by rapid value migration, companies are most successful because they adopt a proactive

attitude, replacing the key elements of their basic business model by adjusting their business model to current business conditions.

Sustainability as a parameter that describes business models in a positive way for different groups of stakeholders should increase their investment attractiveness. A sustainable business model should inspire increased investor confidence. Therefore, value should migrate from unsustainable to sustainable business models. The relationship between the degree of business model sustainability and value migration is a new research area in the field of value-based management.

4. The Investment Attractiveness of the Sustainable Business Models of Digital Economy Companies on the NewConnect Market

The investment attractiveness of business models is a decisive factor in capturing value in capital markets [62]. Investors are looking for different methods to assess the investment attractiveness of business models. A particular difficulty is the assessment of the attractiveness of business models of companies operating in the digital economy. Therefore, the attribute of sustainability can greatly increase the investment attractiveness of digital economy business models. It may allow, to a greater extent than other criteria of the investment attractiveness of business models, for capturing value from the market where a given company operates, in addition to value from investors.

A business environment was defined for the purposes of scientific research. It is a place where it is possible to find a large number of companies that operate in the digital economy and meet the sustainability criteria. The area of interest was NewConnect, the Alternative Investment Market of the Polish Stock Exchange in Warsaw. This market is dedicated to innovative companies with great development potential. While observing the dynamics of the NewConnect market at the turn of the decade of 2007–2017, their business models were volatile, which resulted in the inability of companies to achieve the expected growth and even in their bankruptcy, loss of competitive advantage, ability to create value, reduced investor interest, and, in particular, loss of market value. This means that very often these models failed, and the original features of the business models designed became unstable. Therefore, this problem needs to be investigated thoroughly from a cognitive perspective. Sustainability may be a factor in making business models less volatile and as a result, capable of capturing more value. The NewConnect market is an interesting environment for testing business models. On 30 August 2007, the Stock Exchange launched an alternative market called NewConnect for small companies with high growth potential. The alternative stock trading system created new links especially between companies in innovative or non-traditional sectors with high growth potential and investors seeking opportunities to participate in these dynamically evolving segments of the economy. The NewConnect market also facilitated access to funding sources for new projects and the tremendous opportunities for information exchange, promotion and customer acquisition. As a result, smaller companies and entrepreneurs in the most innovative sectors are able to implement projects that will change their industry and increase the efficiency of the various sectors of the economy. The market is intended, first of all, for innovative, dynamic companies with high growth potential from different industries, with preferences for the broadly defined IT sector, electronic media, telecommunications, biotechnology, environmental protection, alternative energy supply, various types of modern services and others. NewConnect is an excellent offer for young companies with a short history of activity, aiming to raise funds for development up to a dozen or so million zlotys. The capital raised should enable the company to develop in an accelerated way. It is also assumed that the listed companies will treat NewConnect as an intermediate step on the way to the main WSE floor, which is the target market. It also promotes the best issuers on the NewConnect Lead market, grouping companies with high potential for moving to a regulated market. The development of the capital market in Poland, by creating an alternative trading system, is an undoubted success. The NewConnect market encourages potential newcomers, first and foremost by the possibility of quickly raising the necessary capital, reduced requirements and relatively low debut costs (3.5–5.5% of the topic value). The presence on the NewConnect market also promotes the company and its prestige. The risks associated with NewConnect are primarily the risk

of significant fluctuations due to speculation, low liquidity, and in addition, the introduction of new external shareholders to the company may cause difficulties in making decisions or disputes within the company. It should be noted that companies listed on NewConnect are usually young companies at the early stages of development, characterized by the potential high PBV (price to book value) and low dividend yield (DY). This situation is mainly due to the current conditions: the lack of capital at the initial stage of development and the allocation of any profit for further investment. Research into the business models of companies listed on the NewConnect market of the Warsaw Stock Exchange will help identify the strength inherent in sustainability through the measures of value migrations. Based on research, recommendations for the reconfiguration of business models will be indicated by including a sustainability factor in these business models to retain value. The conceptualization of the processes of value migration to digital sustainable business models is presented in Figure 3.

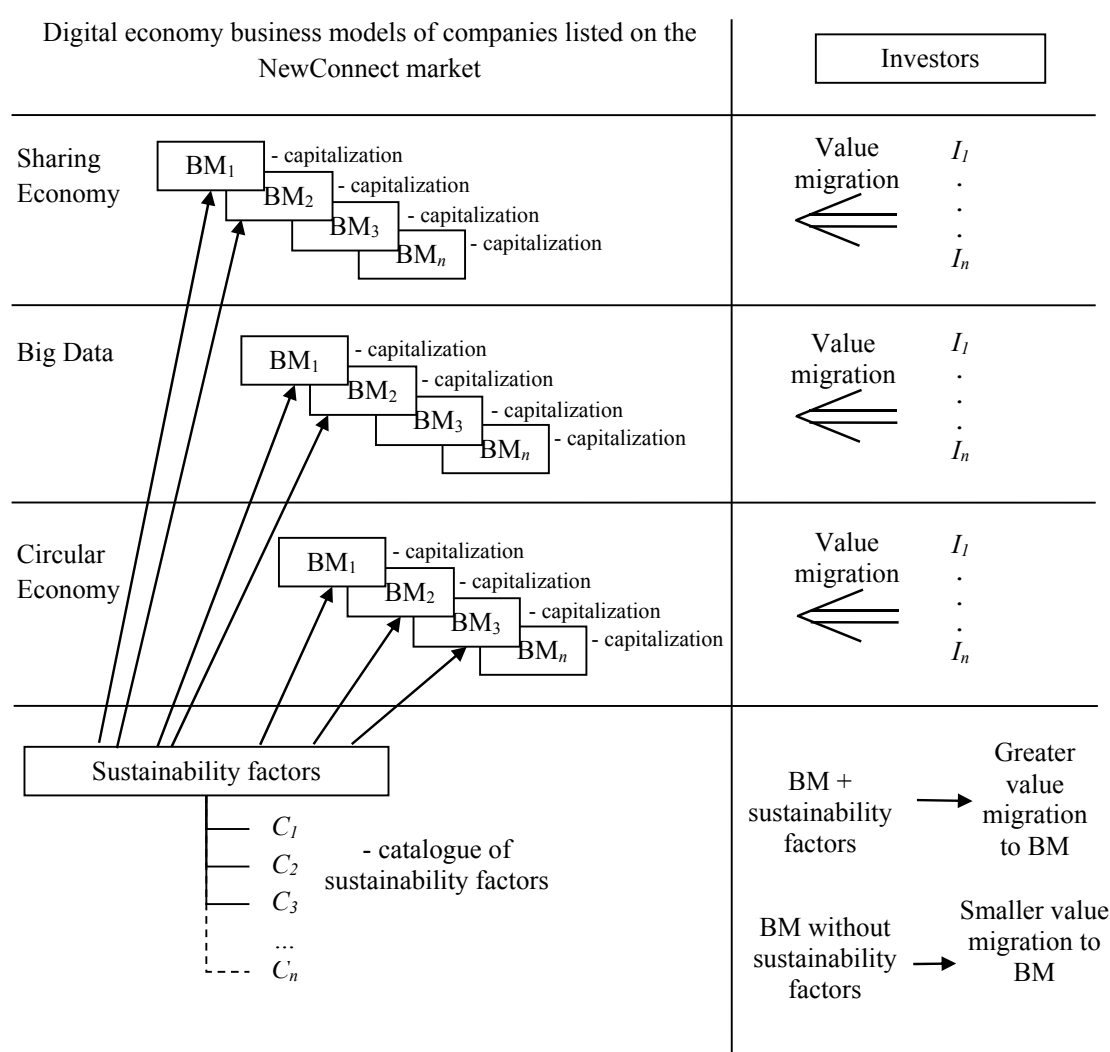


Figure 3. Conceptualization of the processes of value migration to sustainable business models. Source: Own study.

In the presented conceptualization, some business models operating in the digital economy within the framework of the concepts of the sharing economy, Big Data and the circular economy include sustainability factors, which is conducive to capturing value from investors, which subsequently translates into creating a better value proposition for customers and increasing company value in general. This conceptual model presented was verified during the research process adopted.

Variables that describe value migration from the NewConnect market business models operating in the digital economy is presented in Appendix A Table A3.

5. Research Methodology

Qualitative and quantitative research was used to assess value migration to the Sustainable Business Models of digital economy companies. Research triangulation was applied, that is, a combination of different approaches used as one method to strengthen the rigor of the research methodology. A method means a procedure covering different methodological approaches. A starting point was the assumption that qualitative and quantitative methods should be perceived as complementary and not competitive [63]. As quantitative research, the analysis of companies' financial performance in terms of market value ratios was adopted, while as regards qualitative research, the analysis of the description of business model features was conducted, which was based on the publicly available information documents of the companies examined. As part of quantitative research, key ratios determining value migration on the capital market, namely the P/BV and P/E ratios were calculated. According to A. Slywotzki, a company is included in the stage of value stabilization if the quotient of the market value to sales revenues is within $(1.0 \div 2.0)$. Extreme values are the stage of the outflow of value (the value of the indicator below 1.0), i.e., within the range $(0 \div 1.0)$. At the stage of value inflow, the value of this indicator is above 2.0, within the range $(2.0 \div \infty)$. A sustainable business model is characterized by stability in the sphere of quantitative and qualitative variables [40]. The calculations were made in 2016 and 2017 based on data from the financial reports of companies listed on the NewConnect market of the Warsaw Stock Exchange.

In order to assess quality criteria that describe the level of saturation of sustainability features in the digital business models of companies listed on the NewConnect market, qualitative research was used and publicly available information documents were analyzed. Appendix A Table A1 presents selected digital economy companies listed on the NewConnect Alternative Investment. As regards the identification of sustainability features, three criteria related to environmental aspects, twelve for ethical ones and one financial criterion were defined. In total, thirteen criteria were used in the assessment of value migration and description of the sustainability features of business models.

The research procedure covered:

1. Collecting the relevant literature on the subject of sustainable business models.
2. Analyzing the evolution of the concept of a sustainable business model and its key trends.
3. Defining the key attributes of digital business models and their development trends, taking into account strategic reflection.
4. Selecting a research sample of value migration to the sustainable business models of companies operating in the digital economy and listed on the NewConnect market.
5. Defining the features of the sustainable business models of companies operating on the NewConnect market based on the analysis of data contained in information documents.
6. Defining and using indicators defining value migration to sustainable business models.
7. Developing the results of research into value migration to sustainable business models.
8. Developing the methodology of value retention through sustainability factors in digital economy business models.
9. Formulating conclusions.

5.1. A Research Sample

From among all the companies surveyed listed on the NewConnect market of the Warsaw Stock Exchange such companies were selected that operate in the digital economy. The total number of these companies is 70, which is 17% percent of all companies. During research, information referring to business models contained in the publicly available information documents of the companies in question was used. Information documents are a simplified version of the prospectus. They are issued

in both printed and electronic versions and they can be found on the NewConnect market website and the websites of individual companies and this is mandatory. Information documents contain a lot of reliable data about the company and its industry. The data is verified by an authorized adviser, who bears liability for them. Each information document contains floatation data, data on the company and its activities, risk factors for share buyers, information on company managers and supervisors, data on main shareholders and the financial statements of the company. Information about the company's activity includes basic data on products, goods and services and markets that the company operates in. It is important to discuss the industry and its development prospects. Data on the attributes of business models can be found in the part devoted to the business model, development strategy implemented, and risk factors.

5.2. Research Hypotheses

With reference to the research problem, two research hypotheses were formulated:

Hypothesis 1. *The digital economy is a new space in which it is important to guarantee an ethical approach to designing business models to ensure the long-term success of the company.*

Hypothesis 2. *Sustainability is a factor conducive to the capture of value by the business models of companies operating in the digital economy on the capital markets.*

In order to identify the attributes of sustainable business models, the criteria for qualifying business models in this category were defined. Criteria were defined in terms of the classical approach to the concept of sustainability, defining them in the areas of ecology, ethics and economics.

The following criteria for assessing the application level of sustainability principles in business models were defined. The data proposed, that characterize sustainability features, were developed based on the review of the relevant literature and the selection of such attributes that refer to the specificity of digital economy business models. While selecting the criteria, the proposal of sustainable business model archetypes was used, which were significantly modified [64]. The following criteria for the assessment and classification of business models were adopted.

Within the area of ecology:

1. The business model of the company is oriented towards activities for sustainable development (e.g., for environmental protection with the use of the circular economy, for energy efficiency, renewable energy sources, etc.),
2. A business model exposes the sustainable consumption of goods and services,
3. A company engages in pro-environmental undertakings.

Within the area of ethics:

4. A condition for the existence of a business model is embedding it in the idea of supporting social integration-social values,
5. A business model does not violate the law or the generally accepted principles of business ethics,
6. A business model does not violate the principles of market competitiveness—it does not violate antitrust rules—it does offer excessive prices, which would be an abuse of its position in relation to customers,
7. A business model is not based on using unrealistically low prices, which could be used to eliminate competitors from the market,
8. A business model is not based on discriminating customers,
9. A business model is not based on forcing contractors into certain commercial terms,
10. A business model is not based on the assumption of setting minimum or fixed prices for the sale of products to the distributor/broker,

11. A business model is based on the sales process with the use of transparent regulations, sales conditions and standard contracts, which are easy to understand by the average consumer,
12. A business model is based on activities that provide consumers with an easy and cost-free way of contact, and in particular, it gives the opportunity to contact by phone, informing consumers about the hours of their availability, and in the case of contact via e-mail, it informs consumers about the maximum wait time for a response.

Within the area of economics:

13. The company is focused on creating value for shareholders.

The P/BV ratio was used in the assessment of the economic aspects of business models of the companies surveyed.

Selected NewConnect companies that fulfill qualification criteria for studying sustainability factors Information Technology companies using of the concepts of the sharing economy, the circular economy, and Big Data are presented in Appendix A Table A2.

6. The Results of Research into Value Migration to the Sustainable Business Models of Digital Economy Companies Listed on the NewConnect Alternative Investment Market

The information documents of digital economy companies listed on the NewConnect market were used during research. Information documents and websites of all 70 companies surveyed were analyzed. They indicated that four of them operate in the area of the sharing economy, 1—the circular economy, 15—Big Data, 31—E-commerce and 32—others IT see Figure 4.

Companies operating in particular areas

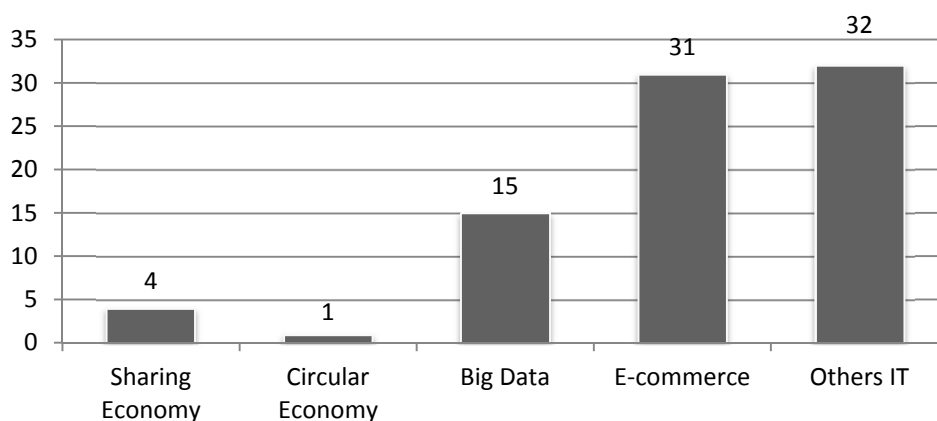


Figure 4. Companies operating in particular areas of the digital economy. Source: Own study based on information documents.

Most companies listed on the NewConnect market of the Warsaw Stock Exchange operate in the field of e-commerce and IT systems. Fourteen of them use the Big Data assumptions. The Sharing Economy and Circular Economy concepts are particularly poorly represented. In this respect, there are not many companies in this market yet. Therefore, the research in question is worth replicating in the future.

In order to assess the investment attractiveness of companies in terms of the economic criterion, the P/BV ratio was used. Figure 5.

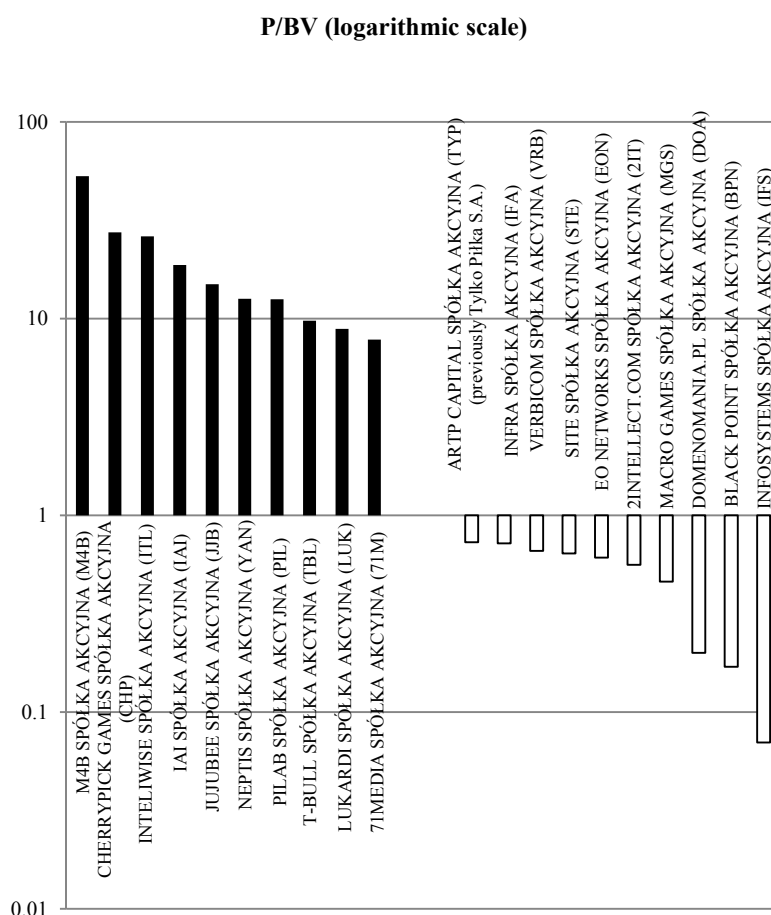


Figure 5. The 10 companies with a maximum Price-to-Book Value (P/BV) value and 10 companies with a minimum P/BV value. Source: Own study.

Figure 5 shows companies with a minimum P/BV value and 10 companies with a minimum P/BV value. For improved readability, a logarithmic scale was used. The best results of the P/BV ratio for the surveyed companies are in the range of 52 to 7, while those characterized by its low value are close to 0.

A total of 10 companies with a maximum P/BV value (outer circle) and 10 companies with a minimum P/BV value (inner circle) by sector are presented in Figure 6. The most companies that have achieved the highest values belong to the group of companies operating in the field of e-commerce and in the field of software development and IT systems.

Eleven companies that meet sustainability criteria were isolated from the digital economy companies that were analyzed. This accounts for 15.71% of the total population surveyed. The list of companies that meet sustainability criteria is presented in Table 2. The research was conducted by identifying individual sustainability features for the area of ecology, ethics and economics, seeking information on the subject and other secondary data in company information documents and on websites. An answer to the question whether sustainability is a new source of company value was sought.

In order to analyze the economization of the business models of companies operating in the digital economy, the analysis of P/BV and P/E ratios achieved by these companies was conducted. Table 3.

Table 2. List of companies that meet sustainability criterion.

No.	Company	Sustainability Criterion	Scope of Activities
1.	4MOBILITY SPÓŁKA AKCYJNA (4MB)	Activity on the Internet marketing and IT services markets	Software
2.	71MEDIA SPÓŁKA AKCYJNA (71M)	Sale of e-readers	E-commerce
3.	BLACK POINT SPÓŁKA AKCYJNA (BPN)	High quality printing materials and the highest quality training and maintenance services, as well as ensuring the receipt and qualified disposal of waste in the form of used printer cartridges.	Information technology-other
4.	DIGITAL AVENUE SPÓŁKA AKCYJNA (DGL)	publisher, among others the largest Polish website for sharing photos-Fotosik.pl, Styl.fm-one of the leaders in the segment of women's fashion and beauty services, and FashionStyle-online games	Web portals
5.	DOOK SPÓŁKA AKCYJNA (DOK)	Design and implementation of innovative solutions using network technologies and native mobile technologies	Software
6.	EDISON SPÓŁKA AKCYJNA (EDN)	Offering solutions for the exchange of electronic documents (including e-invoices) with partners around the world and a system for archiving documents in the electronic form	Software
7.	E-KIOSK SPÓŁKA AKCYJNA (EKS)	creating electronic platforms for the sale of textual content	E-commerce
8.	LOGINTRADE SPÓŁKA AKCYJNA (LGT)	A technology company operating in the e-procurement market, specializing in providing solutions that support purchasing processes in the B2B segment	Software
9.	MAKOLAB SPÓŁKA AKCYJNA (MLB)	Implementation of projects aimed at the digital transformation of global corporations and the largest Polish institutions	Software
10.	NEPTIS SPÓŁKA AKCYJNA (YAN)	Manufacturer, supplier and operator of innovative solutions in the area of vehicle monitoring, car navigation, the reporting systems of mobile workers' work and the creator of the communicator for Yanosik drivers	Software
11.	PILAB SPÓŁKA AKCYJNA (PIL)	Technologically advanced solutions for data analysis by means of its own patented analytical platform	Software

Source: Own study.

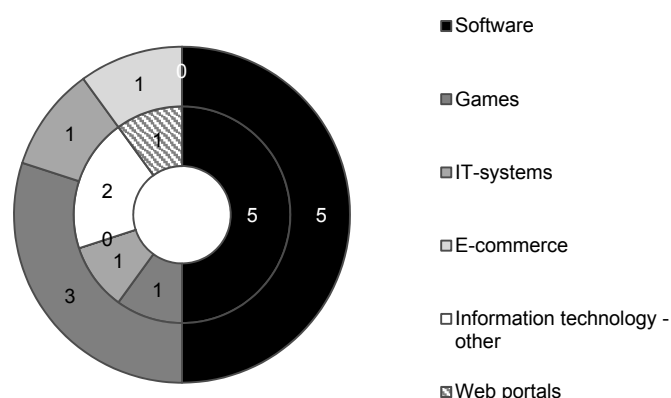
10 companies with a maximum P/BV value (outer circle) and 10 companies with a minimum P/BV value (inner circle) by sector**Figure 6.** The 10 companies with a maximum P/BV value (outer circle) and 10 companies with a minimum P/BV value (inner circle) by sector. Source: Own study.

Table 3. Values of P/BV and Price-to-Equity (P/E) ratios for companies classified as Digital Sustainability.

Digital Sustainability					
No.	Company	P/BV		P/E	
		2016	2017	2016	2017
1.	4MOBILITY SPÓŁKA AKCYJNA (4MB)	75.85	6.53	no data ¹	no data
2.	71MEDIA SPÓŁKA AKCYJNA (71M)	4.16	7.83	10.30	no data
3.	BLACK POINT SPÓŁKA AKCYJNA (BPN)	0.26	0.17	no data	no data
4.	DIGITAL AVENUE SPÓŁKA AKCYJNA (DGL)	3.10	2.26	no data	no data
5.	DOOK SPÓŁKA AKCYJNA (DOK)	no data	5.89	no data	468.70
6.	EDISON SPÓŁKA AKCYJNA (EDN)	1.36	1.09	no data	2.50
7.	E-KIOSK SPÓŁKA AKCYJNA (EKS)	9.02	5.38	26.20	50.90
8.	LOGINTRADE SPÓŁKA AKCYJNA (LGT)	1.50	2.10	no data	16.60
9.	MAKOLAB SPÓŁKA AKCYJNA (MLB)	2.00	2.22	20.10	12.80
10.	NEPTIS SPÓŁKA AKCYJNA (YAN)	9.94	12.62	50.30	72.10
11.	PILAB SPÓŁKA AKCYJNA (PIL)	5.39	12.55	no data	no data
	mean for Digital Sustainability	11.26	5.33	26.73	103.93
	max for Digital Sustainability	75.85	12.62	50.30	468.70
	min for Digital Sustainability	0.26	0.17	10.30	2.50
	mean for 70 Digital Economy companies	53.82	5.29	19.96	46.02
	max for 70 Digital Economy companies	2776.59	52.99	76.10	468.70
	min for 70 Digital Economy companies	0.22	0.07	2.00	2.50

¹ no data—data is not found in the NewConnect Statistic Bulletin. Source: Own study.

Table 3 presents the values of P/BV and P/E ratios achieved by companies that meet the Digital Sustainability criteria in the last two years, i.e., 2016 and 2017. The values of these indices vary.

The Table 3 also presents the results of analyzes of the average value of obtained P/BV and P/E.

The mean value for P/BV for sustainability companies in 2016 (11.26) was lower than the mean value for 70 digital economy companies, which was 53.82. However, in 2017 the situation reversed because the mean value for digital sustainability was 5.33 and the mean for the digital economy was 5.29. Nevertheless, in both cases the maximum value for P/BV was lower for digital sustainability (75.85—2016, 12.62—2017). At the same time, minimum values for P/BV were higher for digital sustainability (0.26—2016, 0.17—2017) than for the digital economy (0.22—2016, 0.07—2017).

P/BV: mean DS < mean DE (2016), mean DS > mean DE (2017)

max DS < max DE (2016), max DS < max DE (2017)

min DS > min DE (2016), min DS > min DE (2017)

The obtained results indicate that companies with sustainability features do not achieve the higher values of market P/BV ratios than other companies operating in the digital economy. This means that these features are not yet perceptible to investors and are not a key factor determining their decisions to buy shares. Better results were achieved in the assessment of the P/E ratio. Taking into account P/E values, the mean value in 2016–2017 for digital sustainability was much higher than for all digital economy companies. The value of a P/E ratio for digital sustainability was then 26.73 in 2016 and 103.93 in 2017, while for the digital economy 19.96 in 2016 and 46.02 in 2017. Interestingly, in 2017, the maximum and minimum values for eleven digital sustainability companies were the same as for all digital economy companies analyzed. This means that companies with both the highest and the lowest P/E value in 2017 were included in the digital sustainability list. In this situation, Hypothesis 2. Sustainability is a factor conducive to the capture of value by the business models of companies operating in the digital economy on the capital markets, was not verified positively.

P/E: mean DS > mean DE (2016), mean DS > mean DE (2017)

max DS < max DE (2016), max DS = max DE (2017)

min DS > min DE (2016), min DS = min DE (2017)

Digital sustainability companies generated about 13% of the total capitalization in the years 2016–2017 in the area of the digital economy Table 4. The mean value of the capitalization of sustainable companies amounted to EUR 92.90 million in 2016 (compared to the mean value for other companies amounting to EUR 121.81 million) and EUR 90.37 million in 2017 (it was EUR 124.17 million for other companies). Thus, the mean value of capitalization for digital sustainability was lower. The median capitalization of sustainability in 2016 (EUR 47.47 million) was higher than the median capitalization for other companies (EUR 43.59 million). However, in 2017 the situation reversed and the median for digital sustainability was EUR 24.21 million, and for the digital economy—EUR 31.26 million.

Table 4. Key results of researched companies.

Key Parameters	2016 [Million Euro]	2017 [Million Euro]	% in 2016	% in 2017
Capitalization of all companies operating in the digital economy	7044.40	7730.22	100	100
Capitalization of sustainable companies	928.97	994.05	13.19	12.86
Capitalization of other companies	6115.43	6736.17		
Mean value of the capitalization of sustainable companies	92.90	90.37		
Mean value of the capitalization of other companies	121.81	124.17		
Median capitalization of sustainable companies	47.47	24.21		
Median capitalization of other companies	43.59	31.26		

Source: Own study.

7. Discussion

The hypotheses presented have been verified.

Extensive research into NewConnect market companies indicates that the subject of sustainability requires further analysis and research in different perspectives, particularly in the context of the dynamic development of the market of the digital business models of technology companies. The research goals set and hypotheses formulated were verified and falsified.

Hypothesis 1: The digital economy is a new space in which it is important to guarantee an ethical approach to designing business models to ensure the long-term success of the company. The analysis of the information documents of 70 companies included in the digital economy sector and a review of the relevant literature and the analysis of information documents and statements about business ethics in periodic reports of listed companies indicates that listed companies operating in the digital economy are trying to take these aspects into account. It is important to them to meet legal requirements and other requirements of the electronic market. In this way, the first hypothesis was verified positively. The sustainability criteria used in research are applied by the companies surveyed and relate to the areas of ecology, ethics and economics.

Hypothesis 2. Sustainability is a factor conducive to the capture of value by the business models of companies operating in the digital economy on the capital markets.

The second hypothesis that sustainability is a factor conducive to the capture of value by the business models of companies operating in the digital economy on the capital markets was not proven. Companies included in digital sustainability do not achieve better results in the area of market value than other digital economy companies. This means that the issue of sustainability, especially as regards electronic markets, is not well recognized in both the theoretical and the application sphere. Investors

do not yet appreciate the aspects related to the ethics of business models, as well as factors related to environmental and social aspects. The hypothesis should be rejected. In the future, when ethical, social and ecological aspects will play a greater role in generating risk for investors who purchase high-risk companies' shares, companies at the early stages of development, sustainability factors will definitely play a much greater role and the hypotheses formulated may be falsified in subsequent research. This should result in the best results of market value P/BV and P/E ratios as indicated above, digital sustainability companies generated about 13% of the total capitalization in the years 2016–2017 in the area of the digital economy. The mean value of the capitalization of sustainable companies amounted to EUR 92.90 million in 2016 (compared to the mean value for other companies amounting to EUR 121.81 million) and EUR 90.37 million in 2017 (it was EUR 124.17 million for other companies). Thus, the mean value of capitalization for digital sustainability was lower. The median capitalization of sustainability in 2016 (EUR 47.47 million) was higher than the median capitalization for other companies (EUR 43.59 million). However, in 2017 the situation reversed and the median for digital sustainability was EUR 24.21 million, and for the digital economy—EUR 31.26 million.

8. Conclusions

The topic of sustainability is quite widely recognized in the relevant literature in terms of new approach to business models. However, the concept is only somewhat recognized in the field of electronic markets. Literature research and research into the NewConnect alternative market companies indicate that companies classified as digital sustainability do not differ in terms of market value from the value of companies from the entire market of digital economy companies on this market. It should also be noted that there is no value migration in this case. Research findings do not confirm that value migrates from less attractive companies (in this case, non-digital sustainability companies) to more attractive ones (in this case it was assumed that they should be companies classified into the digital sustainability category). Considering that 70 NewConnect market companies operate in the field of electronic markets, which accounts for 17% of all companies listed on this market, the number of companies included in the digital sustainability category is even lower—only 16% of companies operating in this narrowed area of the digital economy. However, the subject of sustainability seems to be rapidly evolving. Despite the fact that this is not confirmed unequivocally by the research results obtained, business models that fulfill requirements in the area of ethics, ecology and economics, adequately interpreted for electronic markets, should be the key information underlying investment decisions taken by investors. The social aspect of new business models is also a key topic many of them base their ideas on concepts such as the sharing economy, the circular economy and Big Data. These concepts treat an approach to the market differently than the neoclassical method. Economic aspects are not always the drivers; in many cases, a social aspect is a driver for the creation of economic value and it is a priority in this respect. Social profit also counts in addition to economic profit. The impact of the research conducted on the development of the theory and practice of sustainable business models seems worth discussing. Until now, there has been little focus on the search for answers to questions about value migration in terms of sustainable business model criteria. The features of sustainable business models in the context of the digital economy have been poorly researched. Value migration as an important theory of economics and management should be more widely recognized in terms of factors relevant to the sustainability concept. This article shows new trends in the challenges of the digital economy in relation to sustainability requirements in the context of value migration on the capital market. Research results should inspire managers and the creators of business models to take sustainability-related factors into account in their projects.

9. Limitations

Limitations that can be identified result directly from the low effectiveness of the NewConnect market, which may, to some extent, affect the obtained values of P/BV and P/E ratios. This is a problem of many stock exchanges. Although research covers all companies in the Digital Economy

sector, there are only 70 companies listed on the NewConnect market that operate in the Circular Economy, the sharing economy, and Big Data. It means that in the future it is worth repeating the research to ensure the replication of scientific research. Another limitation is also the selection of the qualification criteria for companies as those that can be classified as the users of sustainable business models. Replication of scientific research is justified when more companies from the Digital Economy sector will be listed on the Exchange Market, in particular business models based on the assumptions of Sharing Economy, Circular economy and Big Data. In addition, as the securities market efficiency will increase, the credibility of data based on market value indicators will increase.

Funding: This research received no external funding.

Conflicts of Interest: The author declares no conflict of interest.

Appendix

Table A1. Selected digital economy companies listed on the NewConnect Alternative Investment.

No.	Name of the IT Company	Sector	Website	Sharing Economy Company	Circular Economy Company	Big Data Company	E-Commerce	Others IT
1.	BIZTECH KONSULTING SPÓŁKA AKCYJNA (BTK)	IT systems	http://biztech.pl/	X		X		
2.	LUKARDI SPÓŁKA AKCYJNA (LUK)	IT systems	http://lukardi.com/					X
3.	MEGA SONIC SPÓŁKA AKCYJNA (MGA)	IT systems	http://www.megasonic.pl/					X
4.	PROVETA IT SPÓŁKA AKCYJNA (PRV)	IT systems	http://provectasa.pl/					X
5.	S4E SPÓŁKA AKCYJNA (S4E)	IT systems	https://www.s4e.pl/					X
6.	SEVENET SPÓŁKA AKCYJNA (SEV)	IT systems	https://www.sevenet.pl/					X
7.	SUNTECH SPÓŁKA AKCYJNA (SUN)	IT systems	http://www.suntech.pl/pl/					X
8.	SURFLAND SYSTEMY KOMPUTEROWE SPÓŁKA AKCYJNA (SSK)	IT systems	http://ssk.com.pl/					X
9.	VERBICOM SPÓŁKA AKCYJNA (VRB)	IT systems	http://verbicom.pl/					X
10.	IMAGIS SPÓŁKA AKCYJNA (IMG)	IT equipment	http://imagis.pl/					X
11.	71MEDIA SPÓŁKA AKCYJNA (71M)	E-commerce	http://www.71media.pl/		X		X	
12.	ALEJASAMOCODOWA.PL SPÓŁKA AKCYJNA (ALS)	E-commerce	http://www.alejasamochodowa.pl/				X	
13.	ARENA.PL SPÓŁKA AKCYJNA (ARE) (previously Carbon Invest SA)	E-commerce	https://arena.pl/				X	
14.	E-KIOSK SPÓŁKA AKCYJNA (EKS)	E-commerce	http://www.e-kiosk.pl/			X	X	
15.	INBOOK SPÓŁKA AKCYJNA (INB)	E-commerce	https://www.inbook.pl/				X	
16.	INWESTYCJE ALTERNATYWNE PROFIT SPÓŁKA AKCYJNA (IAP)	E-commerce	http://iaprofit.pl/				X	
17.	MERLIN GROUP SPÓŁKA AKCYJNA (MRG) (previously AdMassive S.A.)	E-commerce	http://www.merlingroup.pl/				X	
18.	MODERN COMMERCE SPÓŁKA AKCYJNA (MCE) (previously Air Market S.A.)	E-commerce	http://moderncommercesa.com/				X	
19.	OUTDOORZY SPÓŁKA AKCYJNA (OUT)	E-commerce	http://www.outdoorzy.pl/				X	
20.	PRESENT24 SPÓŁKA AKCYJNA (P24)	E-commerce	http://www.present24sa.pl/				X	
21.	ARTP CAPITAL SPÓŁKA AKCYJNA (TYP) (previously TYLKO PIŁKA S.A.)	Web portals	http://artpcapital.pl/			X	X	
22.	DIGITAL AVENUE SPÓŁKA AKCYJNA (DGL)	Web portals	http://digitalavenue.pl/			X		
23.	FACHOWCY.PL VENTURES SPÓŁKA AKCYJNA (FAV)	Web portals	https://www.fachowcy.pl/	X		X		

Table A1. Cont.

No.	Name of the IT Company	Sector	Website	Sharing Economy Company	Circular Economy Company	Big Data Company	E-Commerce	Others IT
24.	INWESTYCJE.PL SPÓŁKA AKCYJNA (INW)	Web portals	http://spolka.inwestycje.pl/			X		
25.	LANGLOO.COM SPÓŁKA AKCYJNA (LAN)	Web portals	http://langloo.com/			X	X	
26.	2INTELLECT.COM SPÓŁKA AKCYJNA (2IT)	Software	http://2intellect.com/					X
27.	4MOBILITY SPÓŁKA AKCYJNA (4MB)	Software	http://4mobility.pl/	X				
28.	A.P.N. PROMISE SPÓŁKA AKCYJNA (PRO)	Software	http://www.promise.pl/					X
29.	ACREBIT SPÓŁKA AKCYJNA (ACR)	Software	http://www.acrebit.pl/					X
30.	DOOK SPÓŁKA AKCYJNA (DOK)	Software	http://www.dook.pro/					X
31.	EC2 SPÓŁKA AKCYJNA (EC2)	Software	http://ec2.pl/ec2/					X
32.	EDISON SPÓŁKA AKCYJNA (EDN)	Software	http://www.edison.pl/					X
33.	EO NETWORKS SPÓŁKA AKCYJNA (EON)	Software	http://www.eo.pl/					X
34.	EXAMOBILE SPÓŁKA AKCYJNA (EXA)	Software	http://www.examobile.com/				X	
35.	FINHOUSE SPÓŁKA AKCYJNA (FIN)	Software	http://www.finhouse.pl/					X
36.	GRUPA EXORIGO-UPOS SPÓŁKA AKCYJNA (GEU)	Software	https://www.exorigo-upos.pl/en/					X
37.	I3D SPÓŁKA AKCYJNA (I3D)	Software	http://i3d.pl/					X
38.	IAI SPÓŁKA AKCYJNA (IAI)	Software	https://www.idosell.com/pl/				X	
39.	INFOSYSTEMS SPÓŁKA AKCYJNA (IFS)	Software	http://www.infosystems.pl/					
40.	INFRA SPÓŁKA AKCYJNA (IFA)	Software	http://www.infra.pl/				X	
41.	INNOVATIVE COMMERCE A.S. (ICM) (previously iCom Vision Holding, a.s.)	Software	http://www.innocomm.pl/				X	
42.	INTELIWISE SPÓŁKA AKCYJNA (ITL)	Software	https://www.inteliwise.com/				X	
43.	JWA SPÓŁKA AKCYJNA (JWA)	Software	http://jwa.com.pl/					X
44.	KBJ SPÓŁKA AKCYJNA (KBJ)	Software	http://www.kbj.com.pl/					X
45.	LOGINTRADE SPÓŁKA AKCYJNA (LGT)	Software	http://www.logintrade.pl/					X
46.	M4B SPÓŁKA AKCYJNA (M4B)	Software	http://m4b.pl/			X	X	
47.	MADKOM SPÓŁKA AKCYJNA (MAD)	Software	https://madkom.pl/					X
48.	MAKOLAB SPÓŁKA AKCYJNA (MLB)	Software	https://makolab.com/pl-pl					X
49.	MINERAL MIDRANGE SPÓŁKA AKCYJNA (MND)	Software	http://www.mineralmidrange.com/					X
50.	NEPTIS SPÓŁKA AKCYJNA (YAN)	Software	http://www.neptis.pl/	X			X	
51.	NETWISE SPÓŁKA AKCYJNA (NTW)	Software	http://netwise.pl/pl/					X
52.	PILAB SPÓŁKA AKCYJNA (PIL)	Software	https://pilab.pl/					X

Table A1. Cont.

No.	Name of the IT Company	Sector	Website	Sharing Economy Company	Circular Economy Company	Big Data Company	E-Commerce	Others IT
53.	SITE SPÓŁKA AKCYJNA (STE)	Software	http://fatdoggames.com/pl/strona-glowna/			X	X	
54.	STANUSCH TECHNOLOGIES SPÓŁKA AKCYJNA (STT)	Software	https://www.stanusch.com/?q=			X		
55.	UNIFIED FACTORY SPÓŁKA AKCYJNA (UFC)	Software	https://unifiedfactory.com/pl/			X	X	
56.	BLOOBER TEAM SPÓŁKA AKCYJNA (BLO)	Games	http://ir.blooberteam.com/pl/					X
57.	CHERRYPICK GAMES SPÓŁKA AKCYJNA (CHP)	Games	http://cherrypickgames.com/				X	
58.	FOREVER ENTERTAINMENT SPÓŁKA AKCYJNA (FOR)	Games	http://www.forever-entertainment.com/pl				X	
59.	HUCKLEBERRY GAMES SPÓŁKA AKCYJNA (HBG)	Games	http://hgames.eu/				X	
60.	IFUN4ALL SPÓŁKA AKCYJNA (IF4)	Games	http://ifun4all.com/				X	
61.	JUJUBEE SPÓŁKA AKCYJNA (JJB)	Games	http://www.jujubee.pl/pl				X	
62.	MACRO GAMES SPÓŁKA AKCYJNA (MGS)	Games	http://macrogames.tv/			X	X	
63.	QUBICGAMES SPÓŁKA AKCYJNA (QUB)	Games	http://qubicgames.com/			X	X	
64.	T-BULL SPÓŁKA AKCYJNA (TBL)	Games	http://t-bull.com/				X	
65.	THE FARM 51 GROUP SPÓŁKA AKCYJNA (F51)	Games	http://www.thefarm51.com/					X
66.	BIT EVIL SPÓŁKA AKCYJNA (BIT)	Information technology-other	http://bitevil.com/			X	X	
67.	BLACK POINT SPÓŁKA AKCYJNA (BPN)	Information technology-other	http://blackpoint.pl/					X
68.	DOMENOMANIA.PL SPÓŁKA AKCYJNA (DOA)	Information technology-other	https://domenomania.pl/			X	X	
69.	EUROSYSTEM SPÓŁKA AKCYJNA (ERS)	Information technology-other	http://www.eurosystem.com.pl/					X
70.	XPLUS SPÓŁKA AKCYJNA (XPL)	Information technology-other	http://www.xplus.pl/					X

X—Assignment to the concept of management or scope of activities. Source: own study based on information documents.

Table A2. Selected NewConnect companies that fulfill qualification criteria for studying sustainability factors (IT companies using of the concepts of the sharing economy, the circular economy, and Big Data).

		Indication of the Occurrence of a Given Criterion														
		Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market														
No.	IT Companies	Ecology					Ethics					Economics				
		1. The business model of the company is oriented towards activities for sustainable development (e.g., for environmental protection with the use of the circular economy concept, for energy efficiency, renewable energy sources, etc.).	2. A business model exposes the sustainable consumption of goods and services.	3. A company engages in pro-environmental undertakings.	4. A condition for the existence of a business model is embedding it in the idea of supporting social integration-social values.	5. A business model does not violate the law or the generally accepted principles of business ethics.	6. A business model does not violate the principles of market competitiveness—it does not violate antitrust rules—it does offer excessive prices, which would be an abuse of its position in relation to customers.	7. A business model is not based on the use of unrealistically low prices, which could be used to eliminate competitors from the market.	8. A business model is not based on discriminating customers.	9. A business model is not based on forcing contractors into certain commercial terms	10. A business model is not based on the assumption of setting minimum or fixed prices for the sale of products to the distributor/broker.	11. A business model is based on the sales process with the use of transparent regulations, sales conditions and standard contracts, which are easy to understand by the average consumer.	12. A business model is based on assumptions that provide consumers with an easy and cost-free way of contact, and in particular, it gives the opportunity to contact by phone, informing consumers about the hours of their availability, and in the case of contact via e-mail, it informs consumers about the maximum wait time for a response.	13. The company is focused on creating value for shareholders.	Sustainability	Range of Activity
1.	M4B SPÓŁKA AKCYJNA (M4B)	- ¹	-	-	-	X ²	X	X	X	X	-	X	X	52.99	-	a technology company specializing in designing and building mobile solutions for business
		-						X						X		
2.	CHERRYPICK GAMES SPÓŁKA AKCYJNA (CHP)	-	-	-	-	X	X	X	X	-	-	X	-	27.45	-	creating, publishing and distributing computer games to all leading platforms, i.e., iOS, Android, MacOS, Sony PlayStation 4 and Xbox One
		-						X						X		

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
3.	INTELIWISE SPÓŁKA AKCYJNA (ITL)	-	-	-	-	X	X	X	X	X	X	X	-	26.19	-	specialized IT solutions that optimize customer service, e-commerce and internet marketing
		-						X						X		
4.	IAI SPÓŁKA AKCYJNA (IAI)	-	-	-	-	X	X	X	X	X	-	X	X	18.74	-	Systems for Internet sales
		-						X						X		
5.	JUJUBEE SPÓŁKA AKCYJNA (JJB)	-	-	-	-	X	X	X	X	-	-	X	X	14.95	-	development studio involved in the creation of video games
		-						X						X		
6.	NEPTIS SPÓŁKA AKCYJNA (YAN)	X	X	-	X	X	X	-	X	-	-	X	-	12.62	X	manufacturer, supplier and operator of innovative solutions in the area of vehicle monitoring, car navigation, mobile work reporting systems and the creator of the communicator for Yanosik drivers
		X						X						X		
7.	PILAB SPÓŁKA AKCYJNA (PIL)	X	X	-	X	X	-	X	X	X	-	X	-	12.55	X	technologically advanced solutions for data analysis by their own patented analytical platform
		X						X						X		
8.	T-BULL SPÓŁKA AKCYJNA (TBL)	-	-	-	-	X	X	X	X	X	X	X	-	9.75	-	design, production and distribution of games for mobile devices
		-						X						X		
9.	LUKARDI SPÓŁKA AKCYJNA (LUK) (previously SAPpeers.com S.A.)	-	-	-	-	X	X	X	X	X	X	X	X	8.87	-	SAP business software
		-						X						X		
10.	71MEDIA SPÓŁKA AKCYJNA (71M)	X	X	-	X	X	X	X	X	X	X	X	X	7.83	X	e-reader device sale
		X						X						X		
11.	BIT EVIL SPÓŁKA AKCYJNA (BIT)	-	-	-	-	X	X	X	X	-	-	X	-	7.30	-	web and mobile solutions based on proprietary engines (including mobile games for Android and iOS, mobile applications and e-commerce websites)
		-						X						X		
12.	ARENA.PL SPÓŁKA AKCYJNA (ARE) (previously Carbon Invest S.A.)	-	-	-	-	X	X	-	X	X	-	X	X	7.26	-	online shopping platform
		-						X						X		

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
13.	4MOBILITY SPÓŁKA AKCYJNA (4MB)	X	X	X	-	X	-	X	X	X	-	X	-	6.53	X	activity on the Internet marketing and IT services market
		X						X						X		
14.	IFUN4ALL SPÓŁKA AKCYJNA (IF4)	-	-	-	-	X	X	X	X	X	X	X	-	6.4	-	development studio from the Bloober Team group, producing independent computer games (including real-world data type)
		-						X						X		
15.	NETWISE SPÓŁKA AKCYJNA (NTW)	-	-	-	-	X	-	X	X	-	X	X	-	5.93	-	integrator of CRM systems (Customer Relationship Management) and CEM (Customer Experience Management) based on Microsoft technologies (Microsoft Dynamics CRM) in Europe
		-						X						X		
16.	DOOK SPÓŁKA AKCYJNA (DOK)	X	X	-	-	X	X	X	X	-	-	X	X	5.89	X	design and implementation of innovative solutions using network technologies and native mobile technologies
		X						X						X		
17.	E-KIOSK SPÓŁKA AKCYJNA (EKS)	X	X	-	X	X	X	X	X	X	-	X	X	5.38	X	creation of electronic platforms used to sell textual content
		X						X						X		
18.	SUNTECH SPÓŁKA AKCYJNA (SUN)	-	-	-	-	X	X	X	X	X	-	X	-	4.56	-	software development and implementation services
		-						X						X		
19.	THE FARM 51 GROUP SPÓŁKA AKCYJNA (F51)	-	-	-	-	X	X	-	X	X	X	X	-	4.53	-	computer games for PCs, desktop consoles (Xbox 360 and PlayStation 3) and portable consoles. VR applications
		-						X						X		
20.	MODERN COMMERCE SPÓŁKA AKCYJNA (MCE) (previously Air Market S.A.)	-	-	-	-	X	X	X	X	-	-	-	X	3.82	-	sale of IT services
		-						X						X		
21.	KBJ SPÓŁKA AKCYJNA (KBJ)	-	-	-	-	X	X	-	X	X	X	X	-	3.63	-	consulting services and creation of dedicated software on the SAP platform for large and medium-sized companies

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
22.	MINERAL MIDRANGE SPÓŁKA AKCYJNA (MND)	-	-	-	-	X	X	X	X	-	X	X	X	3.49	-	Business Intelligence. Enterprise Planning. Finance Consolidation. a provider of Corporate Performance Management solutions
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
23.	INWESTYCJE.PL SPÓŁKA AKCYJNA (INW)	-	-	-	-	X	X	X	X	-	-	X	-	3.46	-	the owner and publisher of portals occupies a leading position in Poland in the business/finance/law segment (including Inwestycje.pl. KantorOnline.pl. Waluty.com. Kantory.pl. Fundusze24.pl. Twojefinanse.pl)
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
24.	INBOOK SPÓŁKA AKCYJNA (INB)	-	-	-	-	X	X	X	X	X	X	X	X	3.35	-	retail sale of consumer goods
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
25.	FOREVER ENTERTAINMENT SPÓŁKA AKCYJNA (FOR)	-	-	-	-	X	X	X	X	-	-	X	-	3.28	-	production of computer games and broadly defined multimedia entertainment for all currently available platforms (iPad. iPod. Nintendo. PS VITA. Android system. etc.)
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
26.	ACREBIT SPÓŁKA AKCYJNA (ACR)	-	-	-	-	X	X	-	X	-	X	X	X	2.91	-	ERP systems as well as specialized modules. for example: logistics and sales. Business Intelligence. CRM. human resources management. finance and accounting
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
27.	OUTDOORZY SPÓŁKA AKCYJNA (OUT)	-	-	-	X	X	X	X	X	X	X	X	X	2.87	-	sale of goods via the online sales platform
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
28.	BLOOBER TEAM SPÓŁKA AKCYJNA (BLO)	-	-	-	-	X	X	X	X	-	X	X	-	2.84	-	an independent developer of computer games and video games intended for digital distribution to the global market (psychological horrors)
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
29.	GRUPA EXORIGO-UPOS SPÓŁKA AKCYJNA (GEU)	-	-	-	-	X	X	X	X	X	X	X	-	2.76	-	advanced IT solutions for the retail. banking. insurance. production and public administration sectors
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	
30.	UNIFIED FACTORY SPÓŁKA AKCYJNA (UFC)	-	-	-	-	X	X	-	X	X	X	X	X	2.62	-	manufacturer and global supplier of solutions that make sales and customer service automatic
		-	-	-	-	-	-	X	X	-	-	-	-	X	-	

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
31.	SEVENET SPÓŁKA AKCYJNA (SEV)	-	-	-	-	X	X	X	X	X	X	X	X	2.4	-	advanced ICT solutions
		-						X						X		
32.	QUBICGAMES SPÓŁKA AKCYJNA (QUB)	-	-	-	-	X	X	X	X	X	-	X	-	2.38	-	creating multi-platform computer games for iOS. Android. PC (including Steam version and HTML5 Web version). Nintendo 3DS. Sony PS4 and PS Vita and Xbox One. distribution of own games for selected platforms
		-						X						X		
33.	DIGITAL AVENUE SPÓŁKA AKCYJNA (DGL)	X	X	-	X	X	X	X	X	-	X	-	-	2.26	X	publisher. among others. of the largest Polish website for sharing photos-Fotosik.pl. Styl.fm-one of the leaders in the segment of women's fashion and beauty and FashionStyle-an Internet game
		X						X						X		
34.	MAKOLAB SPÓŁKA AKCYJNA (MLB)	X	X	-	-	X	X	X	X	X	X	-	-	2.22	X	Implementation of projects aimed at the digital transformation of global corporations and the largest Polish institutions
		X						X						X		
35.	EXAMOBILE SPÓŁKA AKCYJNA (EXA)	-	-	-	-	X	X	-	X	X	X	X	-	2.21	-	functional applications and games for individual users and dedicated applications for business customers
		-						X						X		
36.	LOGINTRADE SPÓŁKA AKCYJNA (LGT)	X	X	-	-	X	X	-	X	-	X	X	-	2.1	X	a technology company operating on the e-procurement market specializing in providing solutions supporting purchasing processes in the B2B segment
		X						X						X		
37.	EC2 SPÓŁKA AKCYJNA (EC2)	-	-	-	-	X	X	X	X	-	X	X	-	1.8	-	creating IT solutions. advising on IT projects. auditing and improving existing solutions as well as specifying requirements for systems
		-						X						X		
38.	MADKOM SPÓŁKA AKCYJNA (MAD)	-	-	-	-	X	X	X	X	-	X	-	-	1.75	-	Supplier and integrator of proprietary software for managing documents. information and processes in public administration.
								X						X		
39.	PRESENT24 SPÓŁKA AKCYJNA (P24)	-	-	-		X	X	X	X	-	X	X	X	1.51	-	supplier and integrator of proprietary software for managing documents. information and processes in public administration
		-						X						X		

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
40.	PROVECTA IT SPÓŁKA AKCYJNA (PRV) (previously FINANCIAL INTERMEDIARIES POLSKA S.A.)	-	-	-	-	X	X	X	X	X	X	X	X	1.49	-	communication and IT solutions for enterprises combining competences in the field of telecommunications and IT
		-												X		
41.	BIZTECH KONSULTING SPÓŁKA AKCYJNA (BTK)	-	-	-	-	X	X	X	X	X	X	X	X	1.48	-	sale of IT services
		-						X						X		
42.	XPLUS SPÓŁKA AKCYJNA (XPL)	-	-	-	-	X	X	-	X	X	X	X	-	1.42	-	diagnosis and pre-implementation analysis. business consulting. highly-specialized implementations and support of IT systems. solution design and software development
		-						X						X		
43.	A.P.N. PROMISE SPÓŁKA AKCYJNA (PRO)	-	-	-	-	X	X	-	X	X	X	X	X	1.37	-	provider of IT solutions for large and medium-sized enterprises. public administration. educational institutions and health care
		-						X						X		
44.	S4E SPÓŁKA AKCYJNA (S4E)	-	-	-	-	X	X	X	X	X	X	X	X	1.32	-	services in the scope of implementing data archiving and copying systems
		-						X						X		
45.	EUROSYSTEM SPÓŁKA AKCYJNA (ERS)	-	-	-	-	X	X	-	X	X	-	X	X	1.23	-	geodetic and design services for government agencies. state and private sector companies and local governments (services in the field of 3D laser scanning (LIDAR services). digital photogrammetry with the development of digital orthophoto maps and 3D terrain models. measurements and GPS development)
		-						X						X		
46.	JWA SPÓŁKA AKCYJNA (JWA)	-	-	-	-	X	X	X	X	-	-	X	-	1.15	-	advanced IT solutions. IT projects consultancy. auditing and improving existing solutions. and specifying IT system requirements
		-						X						X		
47.	EDISON SPÓŁKA AKCYJNA (EDN)	X	X	-	-	X	X	-	X	X	X	X	-	1.09	X	offering solutions for the exchange of electronic documents (including e-invoices) with partners all over the world and a system enabling the archiving of documents in electronic form
		X						X						X		

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
48.	LANGLOO.COM SPÓŁKA AKCYJNA (LAN)	-	-	-	X	X	X	X	X	X	-	X	X	0.99	-	online educational website and e-learning platform for anyone interested in learning and improving English
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
49.	ALEJASAMOCHODOWA.PL SPÓŁKA AKCYJNA (ALS)	-	-	-	-	X	-	X	X	X	X	-	X	0.81	-	online sale of spare parts for cars
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
50.	MEGA SONIC SPÓŁKA AKCYJNA (MGA)	-	-	-	-	X	X	X	X	X	X	X	X	0.78	-	IT systems integrator
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
51.	ARTP CAPITAL SPÓŁKA AKCYJNA (TYP) (previously Tylko Piłka S.A.)	-	-	-	-	X	X	X	X	X	X	X	X	0.73	-	“Start-up factory”. invests mainly in innovative ventures in the digital sector (software, mobile applications, digital media, and e-commerce platforms)
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
52.	INFRA SPÓŁKA AKCYJNA (IFA)	-	-	-	-	X	X	X	X	X	X	X	X	0.72	-	activity in the sector of IT systems supporting management and work organization in the enterprise and offices
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
53.	VERBICOM SPÓŁKA AKCYJNA (VRB)	-	-	-	-	X	X	-	X	X	X	X	-	0.66	-	a group of ICT companies
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
54.																
55.	SITE SPÓŁKA AKCYJNA (STE)	-	-	-	-	X	X	-	X	X	-	X	-	0.64	-	construction, development and management of specialized web portals and the creation of dedicated systems, applications and websites for customers
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
56.	EO NETWORKS SPÓŁKA AKCYJNA (EON)	-	-	-	-	X	X	X	X	X	X	X	X	0.61	-	an international IT company specializing in systems integration in the search solutions and e-sales solutions sector
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
57.	2INTELLECT.COM SPÓŁKA AKCYJNA (2IT)	-	-	-	-	X	X	X	X	X	X	X	X	0.56	-	producer and provider of information technology supporting decision-making processes at every level of company management
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
58.	MACRO GAMES SPÓŁKA AKCYJNA (MGS)	-	-	-	-	X	X	X	X	X	-	X	-	0.46	-	web portals related to broadly defined electronic games. a partner of Microsoft Poland in the development. integration and activation of the Minecraft community in Poland
		-						X						X		
59.	DOMENOMANIA.PL SPÓŁKA AKCYJNA (DOA)	-	-	-	X	X	X	X	X	X	X	X	X	0.20	-	one of the largest providers of hosting services and domain registrars in Poland. servicing mainly medium-sized and small companies and individuals
		-						X						X		
60.	BLACK POINT SPÓŁKA AKCYJNA (BPN)	X	-	X	-	X	X	X	X	X	-	X	-	0.17	X	high-quality printing materials and top-quality training and service services. as well as ensuring the collection and qualified disposal of waste in the form of used cartridges for printers
		X						X						X		
61.	INFOSYSTEMS SPÓŁKA AKCYJNA (IFS)	-	-	-	-	X	X	X	X	X	-	X	-	0.07	-	solutions improving company management-mainly for the printing industry and consultancy in the field of IT solutions
		-						X						X		
62.	SURFLAND SYSTEMY KOMPUTEROWE SPÓŁKA AKCYJNA (SSK)	-	-	-	-	X	X	-	X	X	X	X	X	no data ³	-	integration of ICT systems
		-						X						X		
63.	IMAGIS SPÓŁKA AKCYJNA (IMG)	-	-	-	-	X	X	X	X	X	-	X	X	no data	-	geographic information systems (GIS)
		-						X						X		
64.	FACHOWCY.PL VENTURES SPÓŁKA AKCYJNA (FAV)	-	X	-	X	X	X	X	X	X	-	X	X	no data	-	technology development in the scope of winning orders effectively from the Internet for small and medium-sized service and production companies
		-						X						X		
65.	FINHOUSE SPÓŁKA AKCYJNA (FIN)	-	-	-	-	X	X	-	X	X	-	X	X	no data	-	innovative tools facilitating the work of financial advisors; they introduced a search engine for cash loans and mortgages
		-						X						X		
66.	I3D SPÓŁKA AKCYJNA (I3D)	-	-	-	-	X	X	X	X	X	X	X	-	no data	-	new technologies in interactive 3D graphics
		-						X						X		

Table A2. Cont.

Indication of the Occurrence of a Given Criterion																
Criteria for Assessing the Sustainability of the Business Models of IT Companies on the NewConnect Market																
58.	MACRO GAMES SPÓŁKA AKCYJNA (MGS)	-	-	-	-	X	X	X	X	X	-	X	-	0.46	-	web portals related to broadly defined electronic games. a partner of Microsoft Poland in the development. integration and activation of the Minecraft community in Poland
		-						X						X		
67.	INWESTYCJE ALTERNATYWNE PROFIT SPÓŁKA AKCYJNA (IAP)	-	-	-	-	X	-	X	X	X	-	X	X	no data	-	retail trade in bullion, numismatics and precious stones
		-						X						X		
68.	MERLIN GROUP SPÓŁKA AKCYJNA (MRG) (previously AdMassive S.A.)	-	-	-	X	X	X	-	X	-	-	X	X	no data	-	sales activation in digital channels
		-						X						X		
69.	INNOVATIVE COMMERCE A.S. (ICM) (previously iCom Vision Holding S.A.)	-	-	-	-	X	X	X	X	X	X	X	-	no data	-	Internet services and online communication solutions via mobile technologies and online media (the activity market is the Czech Republic)
		-						X						X		
70.	STANUSCH TECHNOLOGIES SPÓŁKA AKCYJNA (STT)	-	-	-	-	X	X	-	X	X	-	X	-	no data	-	research and development into the use of artificial intelligence in company management
		-						X						X		
71.	HUCKLEBERRY GAMES SPÓŁKA AKCYJNA (HBG)	-	-	-	-	X	X	-	X	X		X	-	no data	-	production of innovative MMORPG games
		-						X						X		

Note: ¹ “-” —does not include; ² X—this criterion is met; ³ no data—data is not found in the NewConnect Statistic Bulletin. Source: own study based on information documents and websites.

Table A3. Variables that describe value migration from the NewConnect market business models operating in the digital economy.

No.	Company Name	Market Value (Capitalization at the End of the Period) [Million Euro] ¹		Sales Revenues [Euro] ²		Market Value/Sales Revenues		Growth Rate of Company Market Value	Growth Rate of Sales Revenues	P/E Ratio ³		Growth Rate of the P/E Ratio	P/BV Ratio ⁴		Growth Rate of the P/BV Ratio
		2016	2017	2016	2017	2016	2017			2016	2017		2016	2017	
IT systems															
1.	BIZTECH KONSULTING SPÓŁKA AKCYJNA (BTK)	no data ⁵	15.34	32,265,085.92	36,385,111.03	- ⁶	0.4215	-	1.1277	no data	14.1	-	no data	1.48	-
2.	LUKARDI SPÓŁKA AKCYJNA (LUK)	no data	19.42	7,346,050.01	11,875,768.01	-	1.6352	-	1.6166	no data	no data	-	no data	8.87	-
3.	MEGA SONIC SPÓŁKA AKCYJNA (MGA)	34.80	28.88	253,301,570.53	134,418,335.19	0.1374	0.2148	0.8299	0.5307	10.3	9	0.87	1.03	0.78	0.7573
4.	PROVECTA IT SPÓŁKA AKCYJNA (PRV)	163.82	375.68	7,280,390.62	no data	22.5011	-	2.2933	-	24.8	no data	-	8.04	1.49	0.1853
5.	S4E SPÓŁKA AKCYJNA (S4E)	76.72	74.43	458,898,908.70	625,024,155.90	0.1672	0.1191	0.9701	1.3620	6.1	no data	-	1.25	1.32	1.0560
6.	SEVENET SPÓŁKA AKCYJNA (SEV)	47.88	29.96	no data	no data	-	-	0.6258	-	no data	no data	-	1.03	2.40	2.3301
7.	SUNTECH SPÓŁKA AKCYJNA (SUN)	23.92	16.63	28,512,655.56	28,706,028.65	0.8389	0.5792	0.6951	1.0068	21.2	32.6	1.54	7.63	4.56	0.5976
8.	SURFLAND SYSTEMY KOMPUTEROWE SPÓŁKA AKCYJNA (SSK)	5.63	9.63	16,354,362.78	9,831,524.00	0.3440	0.9791	1.7111	0.6012	no data	no data	-	2.08	no data	-
9.	VERBICOM SPÓŁKA AKCYJNA (VRB)	52.51	28.75	25,769,333.01	49,706,304.21	2.0376	0.5785	0.5476	1.9289	6	13	2.17	1.35	0.66	0.4889
IT equipment															
10.	IMAGIS SPÓŁKA AKCYJNA (IMG)	no data	43.55	19,543,136.77	19,472,751.08	-	2.2364	-	0.9964	no data	no data	-	no data	no data	-
E-commerce															
11.	71MEDIA SPÓŁKA AKCYJNA (71M)	33.88	24.21	28,717,642.58	18,297,622.32	1.1798	1.3232	0.7146	0.6372	10.3	no data	-	4.16	7.83	1.8822
12.	ALEJASAMOCODOWA.PL SPÓŁKA AKCYJNA (ALS)	16.29	33.26	13,712,024.74	118,810,265.25	1.1883	0.2799	2.0409	8.6647	3.8	3.7	0.97	0.58	0.81	1.3966
13.	ARENA.PL SPÓŁKA AKCYJNA (ARE) (Carbon Invest S.A.)	207.61	257.29	0.00	0.00	-	-	1.2393	-	no data	no data	-	5.23	7.26	1.3881
14.	E-KIOSK SPÓŁKA AKCYJNA (EKS)	61.05	40.71	76,534,464.80	95,646,823.61	0.7977	0.4257	0.6669	1.2497	26.2	50.9	1.94	9.02	5.38	0.5965
15.	INBOOK SPÓŁKA AKCYJNA (INB)	17.84	11.92	11,875,355.65	12,838,674.27	1.5019	0.9283	0.6682	1.0811	no data	45.1	-	5.42	3.35	0.6181
16.	INWESTYCJE ALTERNATYWNE PROFIT SPÓŁKA AKCYJNA (IAP)	48.05	no data	725,626.95	no data	66.2172	-	-	-	no data	no data	-	0.60	no data	-

Table A3. Cont.

No.	Company Name	Market Value (Capitalization at the End of the Period) [Million Euro] ¹		Sales Revenues [Euro] ²		Market Value/Sales Revenues		Growth Rate of Company Market Value	Growth Rate of Sales Revenues	P/E Ratio ³		Growth Rate of the P/E Ratio	P/BV Ratio ⁴		Growth Rate of the P/BV Ratio
		2016	2017	2016	2017	2016	2017			2016	2017		2016	2017	
E-commerce															
17.	MERLIN GROUP SPÓŁKA AKCYJNA (MRG) (previously AdMassive S.A.)	no data	no data	0.00	780,952.02	-	-	-	-	no data	no data	-	no data	no data	-
18.	MODERN COMMERCE SPÓŁKA AKCYJNA (MCE) (previously Air Market S.A.)	302.88	298.25	5000.76	0.00	60,566.67	-	0.9847	-	no data	no data	-	4.97	3.82	0.7686
19.	OUTDOORZY SPÓŁKA AKCYJNA (OUT)	16.63	18.38	15,912,076.73	20,423,466.94	1.0450	0.8998	1.1053	1.2835	76.1	32.1	0.42	2.84	2.87	1.0106
20.	PRESENT24 SPÓŁKA AKCYJNA (P24)	7.33	29.30	2,647,626.75	1,949,021.83	2.7702	15.0312	3.9943	0.7361	no data	22.2	-	0.70	1.51	2.1571
Web portals															
21.	ARTP CAPITAL SPÓŁKA AKCYJNA (TYP) (previously Tylko Piłka S.A.)	18.17	13.63	5,917,107.60	2,187,660.68	3.0707	6.2291	0.7500	0.3697	no data	no data	-	0.71	0.73	1.0282
22.	DIGITAL AVENUE SPÓŁKA AKCYJNA (DGL)	14.84	10.04	5,131,506.08	4,944,255.91	2.8911	2.0313	0.6770	0.9635	no data	no data	-	3.10	2.26	0.7290
23.	FACHOWCY.PL VENTURES SPÓŁKA AKCYJNA (FAV)	493.66	17.63	11,504,319.93	21,285,142.14	42.9107	0.8282	0.0357	1.8502	no data	no data	-	75.56	no data	-
24.	INWESTYCJE.PL SPÓŁKA AKCYJNA (INW)	53.92	175.32	18,344.45	37,105.64	2939.5729	4724.8428	3.2512	2.0227	no data	no data	-	0.94	3.46	3.6809
25.	LANGLOO.COM SPÓŁKA AKCYJNA (LAN)	7.21	12.59	10,041,545.83	9,692,260.67	0.7180	1.2985	1.7457	0.9652	2	20.2	10.10	0.59	0.99	1.6780
Software															
26.	2INTELLECT.COM SPÓŁKA AKCYJNA (2IT)	no data	2.00	4,562,429.80	2,736,824.27	-	0.7309	-	0.5999	no data	no data	-	no data	0.56	-
27.	4MOBILITY SPÓŁKA AKCYJNA (4MB)	209.45	146.65	4,922,958.43	4,581,638.26	42.5453	32.0076	1.1053	0.9307	no data	no data	-	75.85	6.53	0.0861
28.	A.P.N. PROMISE SPÓŁKA AKCYJNA (PRO)	244.79	160.11	1,164,534,330.57	1,185,289,341.43	0.2102	0.1351	0.6541	1.0178	8.4	5.4	0.64	2.67	1.37	0.5131
29.	ACREBIT SPÓŁKA AKCYJNA (ACR)	52.63	40.92	7,775,112.68	7,775,112.68	6.7694	5.2633	0.7775	1.0000	48.9	no data	-	3.28	2.91	0.8872
30.	DOOK SPÓŁKA AKCYJNA (DOK)	no data	15.50	no data	no data	-	-	-	-	no data	468.7	-	no data	5.89	-
31.	EC2 SPÓŁKA AKCYJNA (EC2)	6.46	5.04	8,627,914.66	3,901,784.11	0.7487	1.2923	0.7806	0.4522	2.4	no data	-	1.29	1.80	1.3953
32.	EDISON SPÓŁKA AKCYJNA (EDN)	15.63	22.25	10,705,043.21	11,995,773.54	1.4598	1.8551	1.4240	1.1206	no data	2.5	-	1.36	1.09	0.8015
33.	EO NETWORKS SPÓŁKA AKCYJNA (EON)	52.17	49.51	120,180,764.70	160,945,293.30	0.4341	0.3076	0.9489	1.3392	3.6	4.3	-	0.74	0.61	0.8243

Table A3. Cont.

No.	Company Name	Market Value (Capitalization at the End of the Period) [Million Euro] ¹		Sales Revenues [Euro] ²		Market Value/Sales Revenues		Growth Rate of Company Market Value	Growth Rate of Sales Revenues	P/E Ratio ³		Growth Rate of the P/E Ratio	P/BV Ratio ⁴		Growth Rate of the P/BV Ratio
		2016	2017	2016	2017	2016	2017			2016	2017		2016	2017	
Software															
34.	EXAMOBILE SPÓŁKA AKCYJNA (EXA)	14.67	9.08	1,844,666.05	1,242,922.73	7.9521	7.3092	0.6193	0.6738	18.5	82.8	4.48	3.68	2.21	0.6005
35.	FINHOUSE SPÓŁKA AKCYJNA (FIN)	4.63	1.38	5,058,449.52	4,631,254.34	0.9145	0.2969	0.2973	0.9155	no data	no data	-	7.01	no data	-
36.	GRUPA EXORIGO-UPOS SPÓŁKA AKCYJNA (GEU)	1000.15	430.90	0.00	7,084,410.00	-	60.8235	0.4308	-	29.8	11.6	0.39	7.11	2.76	0.3882
37.	I3D SPÓŁKA AKCYJNA (I3D)	22.09	3.50	13,926,115.86	5,577,398.59	1.5860	0.6276	0.1585	0.4005	no data	no data	-	20.85	no data	-
38.	IAI SPÓŁKA AKCYJNA (IAI)	232.16	628.80	54,643,545.93	80,859,454.60	4.2486	7.7765	2.7085	1.4798	27	39.8	1.47	10.64	18.74	1.7613
39.	INFOSYSTEMS SPÓŁKA AKCYJNA (IFS)	15.75	4.96	8,297,094.30	7,980,379.50	1.8985	0.6214	0.3148	0.9618	no data	no data	-	0.22	0.07	0.3182
40.	INFRA SPÓŁKA AKCYJNA (IFA)	8.13	2.83	2,946,263.31	2,598,983.03	2.7581	1.0903	0.3487	0.8821	59.4	19.1	0.32	2.15	0.72	0.3349
41.	INNOVATIVE COMMERCE A.S. (ICM) (previously iCom Vision Holding S.A.)	no data	no data	no data	no data	-	-	-	-	no data	no data	-	no data	no data	-
42.	INTELIWISE SPÓŁKA AKCYJNA (ITL)	40.17	58.68	5,022,055.78	7,369,318.09	7.9993	7.9621	1.4606	1.4674	no data	71.5	-	22.69	26.19	1.1543
43.	JWA SPÓŁKA AKCYJNA (JWA)	12.84	8.67	12,217,690.14	8,995,157.39	1.0505	0.9636	0.6753	0.7362	3.2	4.9	1.53	2.23	1.15	0.5157
44.	KBJ SPÓŁKA AKCYJNA (KBJ)	37.26	84.64	40,933,141.60	69,126,070.98	0.9102	1.2244	2.2718	1.6888	8.9	10	1.12	2.11	3.63	1.7204
45.	LOGINTRADE SPÓŁKA AKCYJNA (LGT)	9.79	15.67	10,559,322.40	13,157,714.54	0.9274	1.1909	1.6000	1.2461	no data	16.6	-	1.50	2.10	1.4000
46.	M4B SPÓŁKA AKCYJNA (M4B)	47.01	1162.43	44,223,509.41	32,784,088.88	1.0629	35.4570	24.7287	0.7413	4.5	136	30.22	13.85	52.99	3.8260
47.	MADKOM SPÓŁKA AKCYJNA (MAD)	36.76	30.84	12,681,693.66	30,888,190.79	2.8983	0.9984	0.8390	2.4357	no data	5.8	-	2.95	1.75	0.5932
48.	MAKOLAB SPÓŁKA AKCYJNA (MLB)	65.76	81.51	60,302.29	74,471.53	1090.5058	1094.5443	1.2395	1.2350	20.1	12.8	0.64	2.00	2.22	1.1100
49.	MINERAL MIDRANGE SPÓŁKA AKCYJNA (MND)	8.46	8.08	30,892,376.55	25,723,241.80	0.2738	0.3143	0.9557	0.8327	7.3	no data	-	1.56	3.49	2.2372
50.	NEPTIS SPÓŁKA AKCYJNA (YAN)	81.26	125.02	38,715,271.45	43,770,718.60	2.0990	2.8562	1.5385	1.1306	50.3	72.1	1.43	9.94	12.62	1.2696
51.	NETWISE SPÓŁKA AKCYJNA (NTW)	21.21	53.05	27,410,732.46	28,657,412.68	0.7738	1.8512	2.5010	1.0455	no data	16.8	-	3.67	5.93	1.6158
52.	PILAB SPÓŁKA AKCYJNA (PIL)	413.31	498.49	3,094,838.72	4,756,890.77	133.5491	104.7938	1.2061	1.5370	no data	no data	-	5.39	12.55	2.3284

Table A3. Cont.

No.	Company Name	Market Value (Capitalization at the End of the Period) [Million Euro] ¹		Sales Revenues [Euro] ²		Market Value/Sales Revenues		Growth Rate of Company Market Value	Growth Rate of Sales Revenues	P/E Ratio ³		Growth Rate of the P/E Ratio	P/BV Ratio ⁴		Growth Rate of the P/BV Ratio
		2016	2017	2016	2017	2016	2017			2016	2017		2016	2017	
Software															
53.	SITE SPÓŁKA AKCYJNA (STE)	4.08	31.67	no data	no data	-	-	7.7551	-	no data	no data	-	1.46	0.64	0.4384
54.	STANUSCH TECHNOLOGIES SPÓŁKA AKCYJNA (STT)	49.51	no data	1,819,638.08	no data	27.2073	-	-	-	no data	no data	-	2776.59	no data	-
55.	UNIFIED FACTORY SPÓŁKA AKCYJNA (UFC)	265.46	419.36	70,379,775.85	95,880,640.68	3.7718	4.3737	1.5797	1.3623	18.4	12.8	0.70	3.65	2.62	0.7178
Games															
56.	BLOOBER TEAM SPÓŁKA AKCYJNA (BLO)	584.76	309.34	45,209,422.29	46,900,982.28	12.9344	6.5956	0.5290	1.0374	17.9	17.5	0.98	6.43	2.84	0.4417
57.	CHERRYPICK GAMES SPÓŁKA AKCYJNA (CHP)	no data	611.18	no data	no data	-	-	-	-	no data	55.1	-	no data	27.45	-
58.	FOREVER ENTERTAINMENT SPÓŁKA AKCYJNA (FOR)	84.72	103.14	3,446,160.32	8,855,701.49	24.5842	11.6468	1.2174	2.5697	no data	no data	-	4.25	3.28	0.7718
59.	HUCKLEBERRY GAMES SPÓŁKA AKCYJNA (HBG)	no data	no data	no data	no data	-	-	-	-	no data	no data	-	no data	no data	-
60.	IFUN4ALL SPÓŁKA AKCYJNA (IF4)	71.05	66.68	3,543,511.78	4,149,781.88	20.0514	16.0675	0.9384	1.1711	no data	no data	-	5.83	6.4	1.0978
61.	JUJUBEE SPÓŁKA AKCYJNA (JJB)	248.41	127.35	1,540,522.33	4,927,524.99	161.2523	25.8452	0.5127	3.1986	no data	276.3	-	43.08	14.95	0.3470
62.	MACRO GAMES SPÓŁKA AKCYJNA (MGS)	125.44	22.13	15,647,059.57	22,154,600.03	8.0166	0.9988	0.1764	1.4159	23.4	24.4	1.04	2.97	0.46	0.1549
63.	QUBICGAMES SPÓŁKA AKCYJNA (QUB)	76.93	38.88	2,351,957,443.20	2,661,191,939.70	0.0327	0.0146	0.5054	1.1315	no data	40	-	3.99	2.38	0.5965
64.	T-BULL SPÓŁKA AKCYJNA (TBL)	782.54	468.45	40,876,544.87	44,188,057.44	19.1439	10.6012	0.5986	1.0810	43.8	21.9	0.50	29.41	9.75	0.3315
65.	THE FARM 51 GROUP SPÓŁKA AKCYJNA (F51)	294.38	172.23	19,685,719.19	20,952,156.08	14.9539	8.2204	0.5851	1.0643	no data	no data	-	6.93	4.53	0.6537
Information technology-others															
66.	BIT EVIL SPÓŁKA AKCYJNA (BIT)	no data	23.63	951,340.54	2,577,236.22	-	9.1682	-	2.7091	no data	15.9	-	no data	7.30	-
67.	BLACK POINT SPÓŁKA AKCYJNA (BPN)	24.00	14.00	167,867,743.73	162,009,149.61	0.1430	0.0864	0.5833	0.9651	no data	no data	-	0.26	0.17	0.6538
68.	DOMENOMANIA.PL SPÓŁKA AKCYJNA (DOA)	10.21	3.00	14,788,969.33	12,173,996.62	0.6904	0.2465	0.2939	0.8232	11.4	6.0	0.5263	0.71	0.20	0.2817
69.	EUROSYSTEM SPÓŁKA AKCYJNA (ERS)	4.33	5.21	1,774,200.89	6,840,596.36	2.4428	0.7615	1.2019	3.8556	no data	no data	-	0.70	1.23	1.7571
70.	XPLUS SPÓŁKA AKCYJNA (XPL)	36.51	47.72	60,159,445.01	62,305,325.64	0.6068	0.7658	1.3071	1.0357	4.8	9.3	1.9375	1.17	1.42	1.2137

¹ NewConnect Statistic Bulletin for 2016 and 2017; ² A unitary quarterly report for 2016 and 2017. Value includes sales revenues for three quarters of a given financial year; ³ NewConnect Statistic Bulletin for 2016 and 2017; ⁴ NewConnect Statistic Bulletin for 2016 and 2017; ⁵ no data—data is not found in the NewConnect Statistic Bulletin; ⁶ “-” —it is not possible to calculate a given ratio; Source: own study based on information documents.

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